

Scanning - Shortwave - Ham Radio  
Equipment - Computers - Antique Radio



# Monitoring Times

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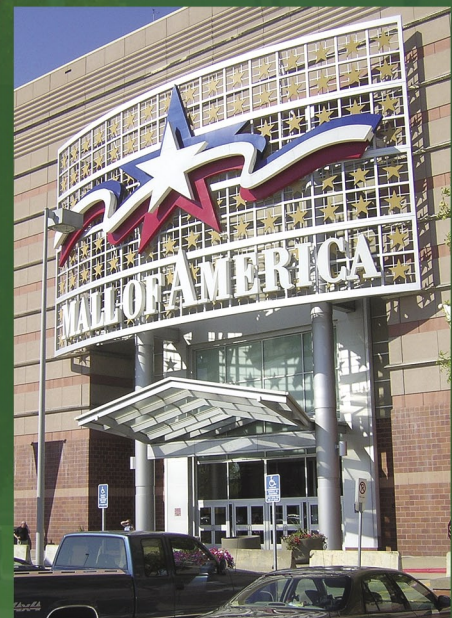
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## Oklahoma Wide-Open Scanning

**Also in this issue:**  
Scanning the Mall of America

**MT Reviews:**  
*Sony in-dash SW receiver*  
*WinRADIO DRM plug-in*  
*Free ACARS decoder*





AOR, the Authority on Radio Makes MORE Than Great Radios!

# Discover these Accessories & Add to your Capabilities.



DA3000

## Antennas for the Great Outdoors

**DA3000:** a 16 element receive wideband discone antenna with useable frequency coverage from 25MHz to 2GHz. Using different length elements to ensure true wideband characteristics, the DA3000 also includes one 'loaded' element to enhance low frequency performance. Engineered and manufactured to AOR's exacting standards, the DA3000 comes with 50 feet of quality RG58/U coaxial cable terminated in a BNC plug for the radio connection and a low-loss TNC plug in the antenna base. Pole clamps are also standard.

Designed for areas where space is a problem or when an "unobtrusive" installation is essential, **SA7000** is a super wideband coverage receive antenna with useable frequency coverage of 30 KHz to 2 GHz. The SA7000 is a passive arrangement with two whip elements: a long element for short wave up to 30 MHz and a second shorter loaded whip antenna for frequencies up to 2 GHz. The loading coils are tuned around 150 & 800 MHz to enhance VHF & UHF performance.



SA7000

## Antennas for Indoor Enjoyment

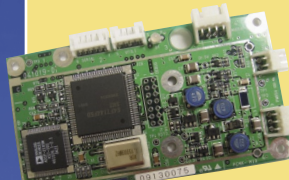
AOR has made performance even better with the new **LA380** indoor antenna as successor to the popular LA350. The LA380 features full frequency coverage (40KHz - 500MHz) using a single receiving element. Designed to provide reception when away from the main monitoring location or when large external antennas are not practical, the LA380 is a compact active (1 foot diameter) loop antenna which features an

internal high-gain amplifier (20dB for 40KHz-250MHz) and excellent overall strong signal handling (high IP3 +10dBm). The loop design allows directional control and nulling noise or interference. Perfect for listening in remote locations or in antenna-restricted areas.



LA380

## Accessories for Added Monitoring Capability



P25-8600  
APC025 Decoder

Now you can monitor APCO 25 signals using an AR8600MKII. The **P25-8600 APC025 Decoder** can be installed in the AR8600MKII receiver to automatically decode the APCO25 signal. The decoded audio is then output from the receiver's speaker. (Installation is required.)

The **TV5000A NTSC TV Internal Converter** adds the ability to receive broadcast television signals (NTSC) and allow monitoring video feeds from a variety of sources including broadcast TV channels, public safety agencies, aircraft, Amateur Radio FSTV, news media video and more when used with AOR AR5000A series of communications receivers.



TV5000A NTSC  
TV Internal  
Converter

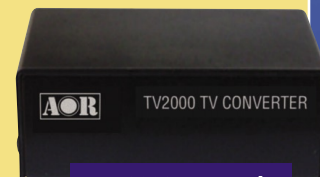


TVA-1 External  
NTSC TV Converter

The **TVA-1 External NTSC TV Converter** is compact, lightweight and easy to install. Designed to be used with the AOR AR5000A series of communications receivers, its simple operation uses the 10.7 MHz IF input from your

receiver. Audio and video outputs allow monitoring a variety of sources such as broadcast TV, public safety agencies, aircraft, Amateur Radio FSTV, news media video and more.

The **TV2000 External NTSC Video Decoder** is designed to be used with the AOR SR2000. Compact and lightweight, no external power supply is required (power is supplied from the SR2000). The video output is available from the rear panel of the TV2000 and audio is provided from the SR2000 through the external speaker jack.



TV2000 External  
NTSC Video Decoder



Authority on Radio  
Communications

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accessories, visit  
the website at  
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# Coming soon:

## The world's first software-defined VHF/UHF scanner on a PCI card.

- Frequency range 9 kHz to 1800 MHz  
*(except cellular bands where required by law)*
- Industry standard PCI card
- Software defined, modular design
- Excellent sensitivity and dynamic range
- Real-time spectrum scope
- Optional down-converter to 3300 MHz
- Optional professional demodulator
- Digital mode ready



Just when you thought that there was nothing in wide-band scanner radios that could surprise you anymore, here comes the new WinRADIO G305i receiver.

Following the unprecedented success of our award-winning range of G3-series shortwave receivers, the G305i software-defined VHF/UHF scanning receiver is ready to change this industry forever.

The first commercially available scanning VHF/UHF receiver where the last IF stage and an all-mode demodulator are entirely executed in software running on an ordinary PC, is now ready to tackle the communications challenges of 21st century.

### The WinRADIO Advantage

The G305i represents yet another exciting step in the process of integration of computer and radio, pioneered by WinRADIO. Being software-defined (rather than just computer-controlled conventional hardware such as some existing competing products), its functionality can be entirely redefined by simply running a different demodulator program, providing the receiver with unparalleled flexibility and performance, and making it ready for all kinds of digital demodulation and decoding.

Combining modular hardware design with innovative software, the WinRADIO G305i receiver exhibits flexibility and performance not normally available in other computer-based receivers, let alone conventional receivers.

The WinRADIO G305i - a truly ground-breaking scanning receiver that will surely amaze you.

*Please visit our website for more information about the WinRADIO range of G3 series radio receivers:*

**[www.winradio.com/g305](http://www.winradio.com/g305)**

*...the future of radio.™*



## Cover Story

### Scanning Oklahoma By John Mayson

MT's intrepid scanning reporter is back on the road again, this time to Oklahoma – a state that holds a number of tourist attractions, especially for folks who enjoy outdoor recreation such as camping, fishing or hunting. We feature two major trunked radio systems – the Oklahoma Public Safety System which covers Tulsa to Oklahoma City, including the Oklahoma Highway Patrol, and the Oklahoma City trunked radio system.

Story starts on page 14.

**On our Cover:** Oklahoma City's National Memorial remembers the victims of the bombing of the Murrah Federal Building(photo by John Mason). Inset: Main entrance to scanning paradise - the Mall of America (photo by Chuck Gysi)

## C O N T E N T S

### Buying and Flying..... 10 By Chuck Gysi

For scanner buffs it's ideal – two great sources of monitoring in one spot! The Mall of America and the Minneapolis/St Paul International airport can both be heard in either location. Listen in on the Mall and air traffic while waiting for your plane, or listen to the airport and Mall from the food court while you send the family off to shop and play in the Mall's huge indoor amusement park. In both locations use your common sense and be discreet in your monitoring to avoid hassles.

Included in the article are tips on how and where to scan for activity, as well as comprehensive frequencies for the Mall and the Minneapolis area.

### Radio in Belfast, Maine..... 18 By Bob Fraser

Moving in our travels from the big city to a small town in New England, Bob Fraser shares the radio landscape of his hometown of Belfast, Maine. This coastal town is another great tourist get-away – no trunked scanner systems here! The jail and sheriffs department of this picturesque county are located in a remodeled house and barn. But there's good marine traffic, especially in the summertime, and plenty to be heard on the broadcast bands as well.

## Reviews

As a "refugee" from satellite radio, Ken Reitz is turning back to old-fashioned shortwave radio in the car, and he's found a welcome ally in the **Sony XR-CA660**. Installation is made as easy as possible considering the tangle of automotive wiring, and the end results are most satisfactory (see p. 68).

Once a manufacturer gets the hardware right in a software-designed radio, it's the software that makes the radio shine. One of the software plug-ins of most interest to MT readers is the **WiNRADiO DRM decoder** for the G313 series computer-hosted radios. Check

out the review on page 70.

Using the magic word "Free," the **ACARSD** decoder program would be a hit even if it weren't an awesome program – which it is! (p. 72)

One thing that's not awesome is the amount of missing information and downright misinformation provided by the makers of cordless phones. Our guest author shares some does and don'ts from personal experience on how to purchase a phone with secure communications between the handset and base unit (p.66).





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# Re\_Inventing Radio through Design and Necessity



## FR250 \$50\* Multi-Purpose

Stay informed and prepared for emergencies with this self-powered 3-in-1 radio, flashlight and cell-phone charger — no batteries required.

- \_ AM/FM/Shortwave Radio Reception
- \_ Built-in power generator recharges the internal rechargeable Ni-MH battery (Included)

- \_ Cell-phone charger output jack 3.5mm (various cell phone plug tips included)
- \_ Built-in 2 white LED light source and one flashing red LED
- \_ Dimensions: 6-1/2"W x 6"H x 2-1/2"D
- \_ Weight: 1 lb. 3 oz.
- \_ Power Source: Built-In Rechargeable Ni-MH Battery Pack; 3 AA Batteries (not included); Crank power alone; AC Adapter (not included); AC Adapter recharges built-in Ni-MH battery pack



## FR200 \$40\* Crank it Up

Without the need for batteries, this self-powered 2-in-1 radio and flashlight helps you stay informed and prepared for emergencies.

- \_ AM/FM/Shortwave Radio Reception
- \_ Built-in power generator recharges the internal rechargeable Ni-MH battery (Included)

- \_ Built-in white LED light source
- \_ 12 international bands
- \_ Dimensions: 6-1/2"W x 5-3/4"H x 2-1/4"D
- \_ Weight: 1 lb. 2 oz.
- \_ Power Source: Built-In Rechargeable Ni-MH Battery Pack; 3 AA Batteries (not included); Crank power alone; AC Adapter (not included); AC Adapter recharges built-in Ni-MH battery pack
- \_ Available colors: Metallic Blue, Metallic Red, Sand



## FR300 \$50\*

All-In-One



This all-in-one unit offers functionality and versatility that makes it ideal for emergencies.

- \_ AM/FM/TV-VHF/NOAA Radio Reception
- \_ Built-in power generator recharges the internal rechargeable Ni-MH battery (Included)
- \_ Can be powered from four different sources:
  1. The built-in rechargeable Ni-MH battery that takes charge from the dynamo crank and from an AC adapter (AC adapter not included)
  2. 3 AA batteries (Not included)
  3. The AC adapter alone (AC adapter not included)
  4. The dynamo crank alone, even with no battery pack installed
- \_ Cell-phone charger output jack 3.5mm (various cell phone plug tips included)
- \_ Built-in 2 white LED light source and one flashing red LED
- \_ Weather alert
- \_ Dimensions: 6-1/2"W x 6"H x 2-1/2"D
- \_ Weight: 1 lb. 3 oz.





## S350 Deluxe \$150\*

High-Performance Field Radio with Stereo Headphones

For S350 devotees the deluxe model combines a sporty new exterior with the same unrivalled functionality.

- \_ Highly sensitive analog tuner with digital display
- \_ Large, full range speaker with bass & treble control
- \_ Clock, alarm, and sleep timer
- \_ Built-in antennas and connections for external antennas
- \_ Headphones included
- \_ Dimensions: 12-1/2"W x 7"H x 3-1/2"D
- \_ Weight: 3 lb. 4 oz.
- \_ Power Source: 4 D or AA Batteries (not included) or AC Adapter (included)
- \_ Available colors: Metallic Red, Black ■■

Improvements over S350:

- \_ FM- stereo via headphones
- \_ AM/SW Frequency Lock
- \_ Set clock and alarm while radio plays
- \_ Operates on 4D or 4AA batteries



## S350 \$100\*

Ruggedly Retro

With the look of a retro field radio sporting a rugged body and military-style controls – the S350 also features today's innovation for excellent AM, FM, and Shortwave reception and a large, full-range speaker for clear sound.

- \_ AM/FM/Shortwave Radio reception
- \_ Highly sensitive and selective analog tuner circuitry
- \_ Liquid Crystal Display (LCD), for frequency and clock display.
- \_ Digital clock with selectable 12/24 hour format
- \_ Dimensions: 10-3/4"W x 7"H x 3-18-1/2"D
- \_ Weight: 3 lb. 2 oz.
- \_ Power Source: 4 D Batteries (not included) or AC Adapter (included)



## YB550PE \$100\*

Digital expertise

Offering high-tech digital performance and portability, the YB550PE packs performance into a small radio. Palm-sized and only 11oz, the YB550PE can receive AM, FM, and continuous Shortwave across all 14 international bands.

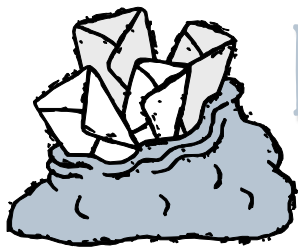
- \_ Shortwave range of 1711 – 29,995 KHz
- \_ Autoscan, direct keypad, and scroll wheel tuning
- \_ 200 customizable station presets
- \_ Alarm and sleep timer functions
- \_ AC adaptor and supplementary antenna inputs
- \_ Dimensions: 3-1/2"W x 5-3/4"H x 1-1/2"D
- \_ Weight: 10.5 oz.
- \_ Power Source: 3 AA Batteries (included) or AC Adapter (not included)



\*Prices do not include Shipping/Handling and applicable taxes.  
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# LETTERS TO THE EDITOR

## Welcome to a New Columnist

Gary Sturm has been editing *Trains* since we inaugurated the *Boats, Planes and Trains* column a year ago. We greatly appreciate the work he has done in presenting this very popular aspect of the radio hobby and were sorry when he said he could no longer write the column. To replace Gary, we introduce Ernest Robl to you this month. Ernest has written on transportation topics and contributed photography to a number of popular and trade railroad publications. He's contributed railroad-related stories to a wide range of other publications from *HSToday* (Homeland Security Today) to *The History Channel Magazine*.

Ernest says, "I started out as a reporter for the news service United Press International (UPI) in the late 1960s and early 1970s (interrupted by two years in the U.S. Army) – and began using radio scanners in the early 1970s to listen to public service agencies for news events that I covered. These included the state highway patrol, forest service, and local police. Actually, my first monitoring receiver (from Radio Shack) wasn't even a scanner. If I remember correctly, it had a place for one crystal for the main channel and a tunable dial for other frequencies.

"I've owned at least a dozen scanners over the years. A Radio Shack console unit (Pro-2046) is installed in my car, fed by a magnet-mount antenna optimized for the railroad frequencies. It stays on most of the time, even when I'm just running errands around town."

Please welcome our newest columnist to *Monitoring Times* and check out his article on page 56. And, of course, if you monitor trains or would like to know more about it, email Ernest with your frequencies and questions at [ernestrobl@monitoringtimes.com](mailto:ernestrobl@monitoringtimes.com)

## Space Shuttle Blues

In this month's feature articles, we're assuming *MT* readers are back on the road across this great country of ours. One popular tourist destination in Florida is the Kennedy Space Center, especially during shuttle launches. Potential launches this summer are July 1 and Aug 28. Publisher Bob Grove and Editor Rachel Baughn have each had the opportunity to sit in the media stands with their radios in years past. But times have obviously changed, as the following letter indicates:

"My name is Greg Harper and I'm an amateur radio operator and a space flight enthusiast.

"I attended the first Return to Flight launch attempt of the Space Shuttle *Discovery* on July 13, 2005. I purchased a shuttle viewing access pass from Delaware North Parks Services for viewing the launch from their facility called the Astronaut Hall of Fame.

"On that day, the launch was canceled. I received the news while listening to a NASA TV retransmission of the launch operations on my HT (a Yaesu VX-R7) on the 2-Meter band.

"I was continuing to listen in on the NASA TV transmission as I was leaving the launch viewing area when all of a sudden I was stopped by a young, makeshift security person that worked for Delaware North Parks Services. Delaware North Parks Services is a private theme park company that runs amusement parks similar to that of Sea World, Bush Gardens and so forth. They are the company that is in charge of and maintains the Kennedy Space Center's Visitors Complex, and is in charge of conducting tours through the Space Center.

"This Delaware North Parks security person informed me that he could not let me operate my radio and 'scan frequencies while on NASA property' and that I must return my radio to my vehicle.

"This was a bit of a shock to me. I have attended many Space Shuttle launches since the last return to flight of *Discovery* in September of 1988, and at every launch I've attended, I've always either had a scanner on me or more recently, the HT radio to listen in to the NASA TV audio rebroadcast of the launch countdown.

"I explained this to the Delaware North Parks security person, but he wouldn't listen. He just kept repeating ... that NASA makes the rules as they choose and that I needed to return my radio to my vehicle or that it would be confiscated.

"He radioed his boss and I told him that I was a licensed ham radio operator using my hand held ham radio to listen in on the NASA TV retransmission of the countdown, and that the frequency I was listening to (the 2-meter band) wasn't even used by NASA or originating from NASA, but from a repeater in the city of Titusville.

"His response was, 'At the pre-launch discussion, we (Delaware North Parks security) cannot permit the use of GPS or 'scanning' radios on NASA property and that those items represented a security threat.' So I complied and turned off my radio and put it away.

"Whether I listened to those published NASA operations frequencies or the local Titusville repeater, I don't understand why I was considered a security threat just because I was listening to radio transmissions on the property itself. What if I were only a few feet away from the property and listening in? Could that be considered a security threat also? The only difference is geography.

"I was told later on that day by another employee ... that the Astronaut Hall of Fame viewing area where I was located wasn't even on NASA property, but instead is Delaware North's property located in the City of Titusville, which furthered my curiosity of the legitimacy of the

security threat claim.

"I would think that transmitting devices, such as cell phones, would be restricted because they can be used to trigger devices, but that wasn't the case. Added to that, I don't see how my somewhat 'primitive' method of information gathering (monitoring the launch operations over my radio) would be considered a security threat when compared to other available items such as wireless palm tops and lap tops which can obtain much more information.

"It's interesting to note that in this post 9-11 environment we are living in, I was allowed by military security at MacDill Air Force Base in Tampa to bring a scanner onto the base property and to the flight line itself to listen in on the aircraft performing at the air show, including the Blue Angels and Thunderbirds, but that I was not allowed by a tourist company to listen in on an already public transmission of Space Shuttle countdown operations that was being relayed through the 2-meter frequency band that NASA doesn't even use.

"I have been thinking of contacting the management staff at Delaware North Parks Services and writing a formal complaint about this issue, but wanted to seek your advice before doing so."

-- Greg Harper, (KG4QPE)

Bob Grove W8JHD replied to Greg,

"Of course, you're right in that you know you don't pose a threat. Keep in mind, however, that all federal agencies are under an official paranoia edict since 9/11. Rent-a-cop security agents can't be expected to judge the validity of electronic devices, so they put the margin of error on their safe side.

"You do point out that the only difference between listening in where you were and listening in at home is one of geography, but that's their point: You couldn't cause much of a problem at home.

"Yes, I would follow up with a formal letter to the agency on whose land you were approached by their representative. I don't think you'll get very far, but it's worth a try."

-- Bob, W8JHD

*Monitoring times* has contacted Andrea Farmer, PR Manager for the company, on behalf of radio hobbyists like Gary. She promised to look into the matter and expressed appreciation for our bringing the matter to their attention.

## Space-saving Appliance Radio

With reference to the January article, "Hot and Cold Appliances" in the *MT Review* section:

"I found your *MT Review* column in the January issue entertaining. You mentioned that 'It's hard to imagine the inspiration which led to

the toaster radio... I can, quite easily in fact. You see, I live in what I call an Oversized Toolshed. My townhouse's kitchen has enough counter space for a microwave oven, a toaster, a coffee machine, a cutting board, and a drain board. My AM/FM has to be kept out in the hallway leading to the kitchen. For those of us with limited counter space, consolidating some appliances makes perfect sense to me.

– Greg Hatzis N2VQQ

## Reader Recommended

### Websites

"I just read about this site on the Kim Komando news letter. [www.v-soft.com/index.htm](http://www.v-soft.com/index.htm)

"If you were ever curious as to who was causing so much overloading from an AM or FM nearby transmitter, check out their 'Zip Code Signal' link. Just enter your Zip Code and you will see how many dBu you're getting bombarded with. 100dBu is considered 'Extremely High' and I seem to have 13 nearby. Life in the big city!"

– Jim (KA7CIC)

One prolific (and anonymous) MT contributor recommended this site for The World Clock/Time Zones [www.timeanddate.com/worldclock/](http://www.timeanddate.com/worldclock/)

Occasional MT writer Ian Poole G3YWX sent us the following news release regarding his website:

"The website [www.radio-electronics.com](http://www.radio-electronics.com) provides free information, tutorials and articles about a wide range of radio and electronics topics. The site, which is run and edited by Ian Poole of Adrio Communications Ltd, aims to provide concise, useful overviews and tutorials in an easy to read form.

"The website now has well over 300 pages of full content, making it one of the largest on the Internet and a significant resource of useful information. It covers a wide range of radio and electronics topics ranging from receiver technology and phase locked loops, through antennas, feeders, circuits and components through to the latest technologies including cellular telecommunications, Wi-Fi, Bluetooth, UWB and more. There are also some pages of interest covering radio and electronics history.

"The site has been in existence for several years and now receives over 200,000 hits per month, with many positive comments from a variety of users of the site."

Sheldon Harvey's emailed Radio HF Newsletter (email [hfnwletter@yahoo.com](mailto:hfnwletter@yahoo.com) to join) always contains interesting radio-related websites (and more). Previous editions of Radio HF Newsletter can be found at: <http://www.anarc.org/cidx/radiohf/index.html> Here's one recent submission:

### BATTERY UNIVERSITY

[www.batteryuniversity.com/](http://www.batteryuniversity.com/)

VIA Elmer Standish, Courtenay, British Columbia

Battery University is an on-line resource that provides practical battery knowledge for engineers, educators, students and battery users alike. The papers address battery chemistries,

best battery choices and ways to make your battery last longer.

Listen on-line to [www.hamradiocast.com](http://www.hamradiocast.com) – Episode #18 is Mark Jensen's interview with MT publisher Bob Grove.

## Eton 350DL

Regarding the MT review of the Eton S350DL portable shortwave receiver in the April issue:

"I strongly disagree with the author's 'Final Thoughts.' The S350 has style but does not have the functions of comparable radios, i.e., Eton E5 or Grundig G4000A. I predict the S350DL will be found at garage sales and flea markets. It will have as much use as an exercise bike or machine. I am an SWL for 40 years on and off. I

have a Radio Shack DX398 for 7 years and it still operates. That radio is the same as the Sangean ATS-909. I have recently bought the Eton E5 and E-10. They are challenging."

-- John Fawcett, Bartonville, IL

*This page is open to your considered comments. Opinions expressed here are not necessarily those of Monitoring Times. Your letters may be rephrased or shortened for length and clarity. Please mail to Letters to the Editor, 7540 Hwy 64 West, Brasstown, NC 28902, or email [editor@monitoringtimes.com](mailto:editor@monitoringtimes.com)*

*Happy monitoring!*

– Rachel Baughn, KE4OPD, Editor

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# COMMUNICATIONS

## WUN R.I.P.

As of April 15, visitors to the Worldwide Utility News club's [www.wunclub.com](http://www.wunclub.com) website simply see a notice that the club no longer exists. What is behind this sudden development? Here is a portion of the notice sent to WUN members by president Ary Boender:

"We have recently received the resignation of Jason Berri as webmaster and Day Watson as editor of the popular Digital Review column. They are not the only ones. Lack of time and other responsibilities force me to step down myself. ... Therefore, we believe that WUN as a club should cease to exist. We do not have the staff to keep going. We have certainly appreciated the input and assistance of many longtime members. However, the work involved simply is too much."

## Utility DXers Forum

"As a replacement, I have started a Yahoo list that is easy and simple to maintain, called Utility DXers Forum. This will eliminate the need for website support and many of the other duties required of an actual non-profit club. UDXF will not be affiliated with WUN. UDXF will focus on the same sort of stations as WUN did, so why not join the list and keep ute dxing alive! <http://groups.yahoo.com/group/udxf/>

## Numbers & Oddities

"The Spooks Newsletter" and the "Numbers & Oddities" website (<http://home.luna.nl/~ary/>) will continue. Numbers stations logs posted to the UDXF and Spooks mailing lists will be included in N&O's future editions.

"On behalf of WUN's staff and editors, I thank you for your support in the past 10 years and I hope to read your logs on the Utility DXers Forum."

— Ary Boender, WUN President

## Cellphones' Danger to Aviation no Myth

Although they were never airborne, Discovery Channel's *Mythbusters* show, episode #49, demonstrated that cellphones do indeed pose a plausible threat to navigation instruments on board aircraft.

The March issue of *IEEE Spectrum* includes a study that was performed in the air in late 2003, under the cooperation of the FAA, three major airlines, and the Transportation Security Administration. The study was sponsored by Carnegie Mellon University which sent three electro-magnetics experts with sensor-laden backpacks aboard 37 commercial flights throughout the Northeast. Passengers' cell phones, laptops, personal stereos, and electronic games all left distinctive signatures on electromagnetic readouts.

Their conclusion? "Our data and NASA studies suggest a clear and present danger: Cell phones can render GPS instruments useless for landings ... Interference from games and wi-fi-equipped laptops can interfere with key cockpit avionics."

Cellphones are particularly dangerous during take-offs and landings, but one phone prevented a take-off in northern England for a slightly different reason: a Thomsonfly pilot at Doncaster's new Robin Hood airport lost his mobile phone in the cockpit. After four hours of fruitless searching, including removing cockpit panels, 189 passengers finally had to be transferred onto a different plane. A spokesman said: "The aircraft could not take off until the phone was recovered as it was still switched on. Phones have to be switched off during a flight for safety reasons." One passenger commented, "At least the pilot was honest right from the start."



## The Trouble with Towers

- Thirteen towers at Playa de Pals, Spain, which broadcast Radio Liberty programming for 40 years, have been demolished. The VOA shut down the station in May 2001 and formally cancelled its lease on the property in the spring of 2003. Although Congress was having second thoughts about having cancelled the lease, Spain settled the issue by blowing the towers up on March 22nd. An onlooker posted a memorable video of the collapse at:

[www.youtube.com/watch?v=0ZWWTmOM28&feature=Recent&page=4&t=1&f=b\\_](http://www.youtube.com/watch?v=0ZWWTmOM28&feature=Recent&page=4&t=1&f=b_)

- The long-delayed dismantling of HCJB's antenna site at Pifo, Ecuador, is gaining momentum. "We know that 30 towers at the Pifo site have to come down by December 2007," says Jim Estes, director of HCJB World Radio's Latin America region. To accommodate new international airport construction near the capital city of Quito, engineering staff have lowered a two-antenna curtain array that HCJB, the "Voice of the Andes," formerly used to air programs to the South Pacific and Europe. Of 48 towers sustaining 32 antenna systems on the 110-acre site, 18 lower-height antennas will not impede approach. But those, too, will be dismantled by the time airport operations are expected to begin in 2009.

Estes and Radio Director Doug Weber are considering various options, as the mission reviews how shortwave radio in Ecuador fits into its objectives. But barring unforeseen circumstances, all transmissions from the Pifo site are expected to cease sometime in 2009.

- For 25 minutes in the wee hours of April 11, the control tower at Seattle-Tacoma International Airport (SEATAC) did not respond to airplane traffic. At 3a.m. one plane was trying to land and another trying to take off, but there was no response from the control tower. The silence only ended when a staff member drove to the tower. At the time, only one controller was required to be in the glassed-in part of the tower, but starting the next day (in a change that the FAA said was already in the works) two controllers were required to be there.
- Late in the day March 28, vandals cut guy wires with a torch and toppled four 197-foot radio towers that are part of a seven-tower cluster in Black Canyon City, Arizona. Knocked off the air was KMIA-AM (710), a Spanish station in Phoenix. It is not known whether the vandalism is related to a contentious lawsuit decided against Black Canyon City residents opposed to the cluster or whether it is connected to immigration issues.

## A Matter of Time

- Sri Lanka has put back its clocks by half an hour to its original standard time, five and a half hours ahead of Greenwich Mean Time (the same as India), which the country maintained till May 1996. Sri Lanka reverting back to its old time zone could be significant to international broadcast listeners.
- Internet time servers help many net functions run smoothly and are important on many levels — such as helping to decide who made the last bid in an eBay auction. But recently it was discovered that many time servers (including some run by the US military, NASA, and government groups around the world) have been swamped by a huge upsurge in time requests and data. Some detective work finally traced the surge to a new line of D-Link routers, switches and wireless access points. Rather than D-Link setting up its own computer to tell all its products the right time, each device has been polling the time servers independently. D-Link is taking action on future devices to be sure the problem does not increase, although there is little they can do about products already owned by consumers.

"Communications" is compiled by editor Rachel Baughn KE4OPD from news submitted by our readers. Thanks to this month's reporters: anonymous, Azizul Alam Al-Amin, John Carson, John Fawcett, Bob Grove, Norman Hill, A Humphrey, Sterling Marcher, Richard Mollentine, Jerry None, Ken Reitz, Michael Reynolds, Doug Robertson, Brian Rogers, Robert Thomas, Gayle Van Horn, Larry Van Horn, Ken Windyka, Ed Yeary; HCJB.

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# Buying and Flying Mall of America and Minneapolis Airport offer lots to monitor

By Chuck Gysi, N2DUP

All photos by Chuck Gysi, N2DUP/scancomm.net

It is perhaps one of the most exciting places to monitor on the continent. Several square miles of prime real estate offer scanner listeners plenty of action in many sectors.

Just outside Minneapolis and St. Paul in the Twin Cities' southern suburbs is the city of Bloomington, Minnesota. The city is the fifth largest in the North Star State, but is a worldwide attraction because it is home to the mammoth Mall of America, a shopping experience anchored by four large department stores and home to more than 520 other stores, shops, restaurants and more. And when we say "more," it's more than most malls ever would consider for tenants.

For instance, you can get married in a complete wedding chapel in the Mall of America, you can attend college classes at the National American University campus inside the mall,

and you can scream at the top of your lungs on rides in the amusement park formerly known as Knott's Camp Snoopy, now the Park at the Mall of America.

Bloomington is at a crossroads in the Twin Cities, too. Right across the looping Interstate 494 from the Mall of America's front doors is the Minneapolis-St. Paul International Airport, a busy airfield that calls itself home to Northwest Airlines as well as several other smaller airlines. Technically, the airport is in the city of Minneapolis, surrounded by several smaller suburbs.

Because MSP (the Twin Cities' airport code) and MOA (what we locals call the Mall of America sometimes – other times it's simply "The Mall") are neighbors, there is an abundance of activity on the airwaves around both properties. Because they are so close, there is an opportunity to monitor both from either location.

All major airports are interesting places to monitor. I have sat in many airports with a scanner and headphones listening and searching for gate crews, baggage handlers, freight shippers, security operations and more. There are so many types of communications to hear at all major airports – in addition to VHF AM air operations. Surrounding airports are ancillary operations such as motels, park-and-ride lots, shuttle buses, taxicabs, car rental agencies, and more. MSP is not unlike any major airport and you can find plenty of communications on the air on all bands.

Likewise, a major tourist attraction such as MOA results in plenty of hotels, restaurants, transportation networks and other shopping attractions in its environs. It goes without saying that the mall itself has a high volume of VHF and UHF communications in every corner of the facility – from store clerks to restaurant customer pagers to entertainment venues.

The 4.2 million-square-foot Mall of America opened its doors in 1992 on the grounds of the former Metropolitan Stadium (a marker is embedded in the mall's floor indicating where home plate was). The mall initially used an 800-MHz trunked Motorola system for its communications; however, today it uses a UHF LTR trunked system.

It's not hard to find the Mall of America on TV. Shopping channel QVC has a store on one of the mall's courts and has broadcast live from



the store. Movies such as "Jingle All The Way" and "Mighty Ducks" were filmed at the mall, and there have been numerous documentaries on the Discovery Channel and The Travel Channel. When the weather gets cold and nasty in the Twin Cities, it's not unusual to find The Weather Channel camped out on the mall's doorstep for broadcast, because it's an easy jump across the interstate from the airport.

"The Mall" is poised to expand in the coming years, too. Plans call for on-site premier hotels, an office/business center with conference facilities, and additional recreational and entertainment attractions, all to be built just north of the mall in an area surrounding a huge IKEA store already recently built. The two phases of the mall will be connected.

*I usually bring my scanner during trips to MOA and I park myself while the others traverse the mall's four levels of shops and fun (and I save money)*

## Where to monitor

I have spent many hours monitoring at the Mall of America and the Minneapolis-St. Paul International Airport over the more than half-dozen years I lived in Minnesota. My wife and I often found ourselves bringing family and friends to "The Mall" when they visited us – or picking up family at the airport. I admit I am not the shopper I once was, perhaps spoiled by online shopping. Thus, I usually bring my scanner during trips to MOA and I park myself while the others traverse the mall's four levels of shops and fun (and I save money).

I have found that the best place to monitor in this area is the third-level food court that overlooks the amusement park in the inside of the mall. I try to pick a table that overlooks the amusement park, which places me a bit closer to the center of the mall. From this vantage point, I can see all four corners of the mall's interior section and the amusement park rides.



*A paramedic ambulance from Allina Hospitals and Clinics in the Twin Cities is parked outside a south entrance to the Mall of America after being dispatched to an emergency call inside the mammoth facility.*

However, I will issue a warning. While I have spent untold hours at tables in the food court with not only one, but up to three scanners running (with headphones to boot), without experiencing problems with security or other officials, I have heard of others who have run into problems with badge-holders at MOA. So be smart: Keep the volume down, don't disturb others around you, and take some effort to be discreet. If you aren't bothering anyone, it's doubtful anyone will bother you. I also have sat in my car in the massive parking lots surrounding the Mall of America without difficulty, but don't be surprised if mall security checks on you if you look suspicious. "The Mall" often has been identified as a possible terrorist target, so security here can be very vigilant.

Monitoring at MSP is more difficult unless you are flying into or out of the airport. Since 2001, getting into the arrival and departure gate areas inside airports is impossible unless you are holding a flight ticket. You might be able to sit in the check-in area of the airport, but there aren't too many other places to go. I have reports from some monitors in the Twin Cities that there are some vantage points outside the airport where one can sit, listen and watch planes. However, in light of national security, I don't feel it's in the best interest to say where these places are; if you are in the area, you surely can find some vantage points. If you are actually flying in or out of MSP, your own departure gate might offer a vantage point to view flights coming in or out of the airport, or you can find a seat in a food court area where you can kick back, grab a burger and break out the scanner headphones (you'll definitely need them to hear over the background noise).

If you decide to visit the Mall of America, make sure you get a motel room that is close to the mall – preferably within a block or two. Many hotels advertise that they are "close" to the mall, but in all reality they may be a mile or more away from the mall. There are many hotels very close to the mall that will offer additional monitoring capabilities while you camp out for the evening after a long, hard day shopping and playing.

## The food court

As I mentioned, the elevated food court at the Mall of America offers a perfect place to monitor with your scanner(s). You can see a good chunk of the interior of the mall's real estate, and if you look up through the skylights over top the amusement park, you actually can see planes departing from MSP right across the highway. Imagine that – you can see planes and hear them from inside the mall! It all adds to a perfect monitoring location – at 72 degrees interior temperature all year long.

While you can see all corners of the mall from inside most areas of the food court, that also helps your scanner penetrate the signals that can get lost inside such a behemoth facility. I have tried using the so-called stubby race antennas on scanners inside the mall to help decrease the signals from outside the mall invading my scanning activity, but I have found that the stubby ducks don't help pull in wanted signals, especially not the low-power operations in the far reaches of the mall near the exterior and in the department stores.

I recommend using a regular scanner antenna when you visit the mall. If you visit on the weekend, you won't hear businesses and other types of operations outside the mall and the airport because they don't operate on weekends. For instance, UHF business frequencies loaded with school bus chatter on weekdays won't flood your scanner during the weekend.

## Where to focus

There are frequency ranges you want to focus on when you visit MOA. I have found so many types of communications on the airwaves at "The Mall" that I cannot identify them all. I attribute this to the fact that many retail operations and even nearby hotels procure inexpensive walkie-talkies on VHF or UHF channels and never bother to license them. I have searched exhaustively for the license of every radio I have heard on the air at MOA and MSP, and very many have come up unidentified. Some frequencies I have monitored at the Mall of America are on channels that aren't licensed to anyone anywhere in the state of Minnesota. Some radio users might be authorized under national licenses for large retail chains (under a discrete corporate name), and I have taken a guess at a few of those in my accompanying frequency lists.

In order of priority, these are some of the business frequency ranges (MHz) I suggest you focus on for retail and entertainment operations when you are visiting MOA:

- 467.750 - 467.925 low-power handhelds, restaurant wait pagers.
- 154.515 - 154.600 base stations and handhelds on 154.515 and 154.540 and handheld radios on 154.570 and 154.600.
- 461 - 465 repeater operations and low-power handhelds, especially nearby hotels.
- 466 - 470 low-power handhelds.
- 151.625 - 151.955 some base stations, but also handheld radios.
- 457.525 - 457.600 low-power handhelds and restaurant wait pagers.
- 451 - 453 Although the mall uses some frequencies in this segment for its trunked system, it's worth looking here for potential new users even with low-power handhelds.
- 462.550 - 462.725 and 467.550 - 467.725 Yes, you can hear all kinds of activity on FRS/GMRS channels, from families and groups to some businesses, too.

Almost all frequencies you find in use at the Mall of America will fall within the segments listed above. I find it advisable to search in small segments, because it will help you uncover infrequent users faster. For instance, I may search from 466 to 467 MHz to try to snag handheld radios. The wider the bandwidth you search, the less chance you have of catching a user on a designated frequency.

If your monitoring target is Minneapolis-St. Paul International Airport, you have several places to look for activity. Here are some places to search, in order of priority (modify for your listening preference):

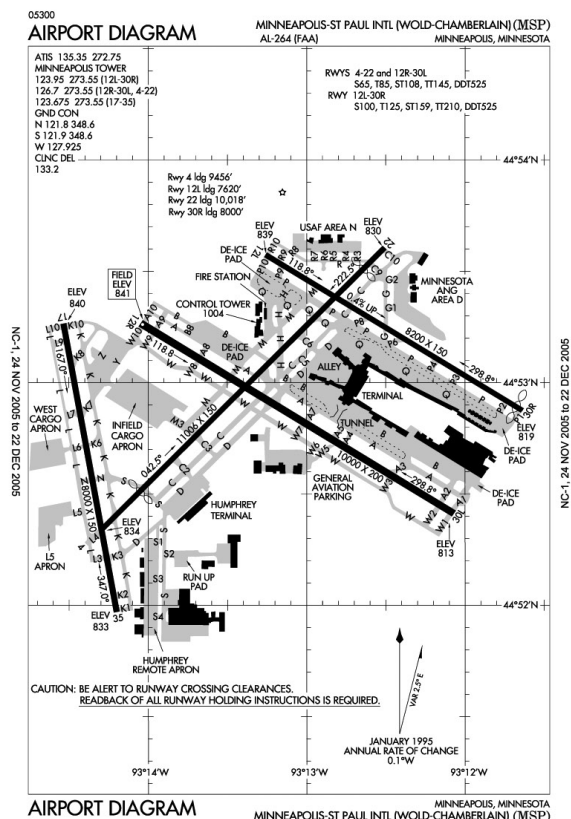
- 118.000 - 137.000 VHF AM air operations can be found in this band.
- 460.650 - 460.875 airline company repeater frequencies for airport operations.
- 461.000 - 465.000 used by airlines and associated businesses (Note: focus on 464 to 465 MHz because many operations can be found within that segment, and 466 to 467 MHz, which is used by many handhelds).
- 466.000 - 470.000 used for handhelds by airlines, freight shippers and associated businesses.
- 457.525 - 457.600 used by handhelds by airlines and others.
- 151.625 - 151.955 check for handheld radios, especially fuel operations.
- 154.515 - 154.600 possible low-power handhelds.
- 451.000 - 453.000 airline operations and associated businesses.

## Trunking

Radio systems that are trunked are active in the Twin Cities metropolitan area, and the area surrounding the Mall of America and the Minneapolis-St. Paul International Airport is no different.

"The Mall" operates its own UHF LTR trunked system, although it uses only one-half its licensed frequencies. Security, housekeeping, maintenance, sanitation, parking and operations staff uses this system at the mall, with each having its own talkgroup.

Across the highway at MSP, Northwest Airlines, which is based at the airport and has its home office nearby in Eagan, Minn., has its own 800-MHz trunked system. Information on the talkgroups on this system is spotty; however, if you use a control-channel scanning receiver, plug in 860.7875 MHz to monitor the Motorola Type II system. Other UHF LTR and 800-MHz systems







*On weekends and in evenings, these walkways through the Park at MOA, the Mall of America's expansive indoor amusement park, are packed with shoppers looking for thrills on numerous rides.*

in place near the airport are used by various users inside and outside the airport.

Public safety in the Twin Cities metro (as well as other areas of Minnesota) has been switching to an 800-MHz trunked digital P25 system. The airport is operated by the Metropolitan Airport Commission, which has numerous talkgroups on the metro trunked system. Minneapolis police and fire also are on this system, and Bloomington police and fire recently made the switch. Nearby St. Paul police and fire, however, remain active on UHF.

If you are sitting at the Mall of America or Minneapolis-St. Paul International Airport, and you have a digital-capable scanner that offers control-channel trunking, plug in 867.3625, which will allow you to hear Bloomington police and MSP airport units. This is the Hennepin County-East site. In addition to patrolling the mall's environs, Bloomington police also have a substation inside the mall for patrols. If for some reason you have trouble monitoring the trunked system with the 867.3625 control channel, try the Metro system's control channel at 860.2375.

Lastly, if you are heading toward Minneapolis, city units there operate off a control channel of 867.0375. (Note that if you have trouble receiving Minneapolis units on that control channel, you might also try the Hennepin-East or Metro control channels because some talkgroups may be simulcast on those towers.)

## A final tip or two

■ Because of the RF-rich environment around the Mall of America and its neighboring airport, it is strongly recommended that you search everything, if you have time. I like to search in 1-MHz segments, but I also do wide searches

hoping to catch some communications. So, while you might search 466 to 467 MHz for handhelds, I also recommend searching the entire 461 to 470 MHz segment to see what you might snag, too.

■ If you don't have an LTR-capable trunking scanner at the Mall of America and you don't want to program in all 10 channels that the mall uses on its LTR system, do this: Program in 452.500 only. This is the home channel for the LTR system and if you monitor it, you will hear most security operations at the mall. The system's other channels typically are used only when the home channel is busy.

■ Keep an ear open for unit numbers on the LTR system that are in the 2000-series, such as 2841. These are security units on patrol in and around the mall.

■ If you hear "Safety Center" on the mall's trunked system, that's the security base substation inside the mall.

There is no shortage of frequencies busy with activity that you can find day or night in the vicinity of the Mall of America or its neighbor, the Minneapolis-St. Paul International Airport. You can monitor a busy airport that hosts a major hub (Northwest Airlines) and you can monitor one of the biggest tourist attractions in the United States — both at the same time. I don't think it gets much better than this.

## ABOUT THE AUTHOR

Chuck Gysi, N2DUP, recently lived in southeastern Minnesota, an hour south of the Twin Cities. He now is editor of a daily newspaper in western Illinois and has written about scanners and other radio communications topics for most hobby radio periodicals for three decades. He is a career journalist who has been a reporter, editor and photographer. His web site is [www.scanning1.com](http://www.scanning1.com) and he can be e-mailed at [chuck@scanning1.com](mailto:chuck@scanning1.com).

### Mall of America

Mall of America LTR trunked system:  
Actual LTR Trunked Logical Channel Numbering:

LCN Frequency  
01464.4375  
03464.2375  
05463.9875  
07463.750  
09463.5625  
11463.275  
13452.500 (home channel)  
15451.925  
17451.775  
19451.325

Additional frequencies assigned by the FCC to this system but not used:  
451.825, 461.750, 461.775, 461.800, 462.250, 463.225, 463.8125, 464.1625, 464.5875, 464.700

Mall of America talkgroups:

0-02-023	Unknown
0-03-030	Unknown
0-05-049	Unknown
0-13-005	Security alarm monitoring "safety center"
0-13-006	Security dispatch "safety center"
0-13-007	Security unit to unit
0-13-008	Contract security guards
0-13-010	Security — parking
0-13-020	Maintenance 1 — plumbers/HVAC crews/electricians

0-13-021	Unknown
0-13-025	Housekeeping 1
0-13-030	Operations 2 — unit to unit
0-13-031	Operations 1 — primary/merchandise units
0-13-033	Housekeeping 2 — unit to unit
0-13-035	Maintenance 2 — unit to unit
0-13-040	Youth escorts
0-13-041	Events 1
0-13-042	Unknown
0-13-053	Unknown
0-13-054	Unknown
0-18-040	Unknown
1-06-078	Unknown

Unit numbering:

100-series	Security
200-series	Housekeeping
300-series	Maintenance — carpenters
400-series	Maintenance — plumbers and HVAC
500-series	Maintenance
600-series	Sanitation
1300-series	Parking
2000-series	Security

Other confirmed mall frequencies:

452.850	Kids Quest
467.925	The Park at Mall of America (formerly Knott's Camp Snoopy) operations
	Underwater World
	General Cinemas Theaters

Retail operations:

151.715M	000	Unknown
151.805M	74.4	Unknown store clerks
151.805M	186.2	Unknown store
151.955M	74.4	Gap or Old Navy
154.515		Clothing store ("body department")
		Unknown clothing store
154.540M		Unknown men's clothing store
154.570M		Old Navy F2
154.570M	74.4	Unknown store
154.570M	D723	Unknown store
154.600M		Unknown

452.275B		Unknown
461.0375M		Unknown
461.0625	74.4	Unknown store
461.200M	D023	Unknown store
461.200M	D244	Unknown department store
462.200R	D152	Unknown department store operations
463.2625R		Unknown
463.3125M		Unknown
463.775M		Unknown security operations
463.8375R	173.8	Nordstrom department store
464.2625M		Nordstrom department store
464.500M		Unknown clothing store
464.500	127.3	Unknown
464.550M		Unknown clothing store
464.550M	67.0	Macy's
464.550M	85.4	Macy's security - voice inversion
464.8125M		Macy's
464.900R	D432	Unknown department store security surveillance
466.1875M	D565	Unknown
466.3375M	D047	Unknown store
466.4875M		Unknown
466.8125M		America's Original Sports Bar
467.5625M	107.2	Unknown (FRS-8)
467.7625M	67.0	Unknown women's clothing store
467.8125M	94.8	Unknown clothing store
467.850M		Unknown restaurant
467.850M	88.5	Clothing store sales crews — Club Libby Lu or Gap
467.850M	D047	Gap or Gap Kids clerks
467.875M	67.0	Club Libby Lu or Gap
467.900M	67.0	Club Libby Lu or Gap
467.900M	79.7	Gap store clerks
467.900M	000	Unknown
467.925M	D743	Unknown department store clerks
468.0125M		Unknown
468.1375M		Unknown
468.3875	D205	Unknown
469.4875M	D114	Unknown clothing store
469.4875M	D546	Unknown clothing store

NOTE: FRS and GMRS channels are busy with families, especially around The Park at MOA

**Other nearby retail/hospitality:**

151.715	192.8	Crown Plaza Hotel shuttles, Bloomington
151.715M	D365	Holiday Inn shuttles, Bloomington
451.450R	D244	Park N Go of Minnesota airport parking, Bloomington (near the mall)
457.575P	000	Unknown restaurant pagers
462.175M	D165	IKEA store loading assistance
462.8375	D115	Unknown hotel
463.8375R	173.8	Unknown hotel
464.1875R	103.5	Unknown hotel housekeeping and maintenance (input 469.1875)
464.325		Unknown nearby hotel
464.475	D047	Radisson South Hotel, Bloomington
464.550	74.4	Unknown hotel
464.575M	74.4	Embassy Suites Hotel, Bloomington
467.925P	000	Unknown restaurant pagers
468.475M	D346	IKEA store customer assistance
469.325M	D152	Comfort Inn or Country Inn "front desk," Bloomington
469.575M	74.4	Embassy Suites Hotel, Bloomington

**Bloomington Central Station construction project nearby:**

463.6375M	D423	McGough Construction crane
464.3875M	D423	McGough Construction crane

**Minneapolis-St. Paul International Airport****Confirmed land mobile frequencies:**

138.925		DTMF signaling
151.685		Unknown fuel ops
151.745P	85.4	Signature Flight Support paging
151.835M	74.4	Signature Flight Support
154.600M	136.5	Unknown airline gate operations
155.940	156.7	Metropolitan Airports Commission maintenance car to car
172.150	P25	Transportation Security Administration (APCO-25 digital)
172.900	P25	Transportation Security Administration (APCO-25 digital)
173.3375	000	Metropolitan Airports Commission automatic vehicle locator data
416.2875		Wind shear transmitters
451.3375		Unknown airline ops
451.450R	D244	Park N Go of Minnesota, Bloomington (near Mall of America)
451.550	156.7	Metropolitan Airports Commission administration
451.700R	146.2	Unknown airport ops
451.8125R	000	Mesaba Airlines "bag room" (LTR system home channel)
451.850R	210.7	Pinnacle Airlines
451.9875R	D371	Bradford Airport Logistics (concourse delivery)
452.7625	LTR	Unknown LTR trunking at airport
453.1625	000	Telemetry
454.925R		Air phone
457.7625M	000	Unknown airline security
457.8875	D632	United Parcel Service operations
460.475R		Metropolitan Airports Commission airport police
460.675R	127.3	United Airlines or Continental Airlines
460.725R	203.5	United Airlines
460.750	114.8	United Airlines or Delta Airlines
460.750R	114.8	United Airlines
460.775R	103.5	ATA Airlines
460.850R	114.8	United Airlines or American Airlines
460.850R	131.8	United Airlines or American Airlines
461.0875R	74.4	Northwest Airlines
461.1125	D412	FedEx operations
461.775R	131.8	Unknown transportation
461.9375R	LTR	Unknown units at airport on LTR trunked system
462.250R	D032	Unknown airline maintenance
462.675M	000	Fletcher's Wharf restaurant - barkeep to kitchen, Humphrey Terminal
463.2125R	LTR	Unknown units on LTR trunked

463.350R	131.8	Northwest Airlines security
463.6625		Telemetry
463.900R	162.2	Signature Flight Support (Sun Country Airlines maintenance contractor)
464.225	88.5	Unknown
464.300R	141.3	Unknown shipping at airport - "packaging sales"
464.325	D054	Ryan International Airlines charters
464.325R	192.8	Unknown airline
464.375R	D162	Globe Airport Security Services
464.475R	D054	Avis Rent A Car
464.525		Unknown car rental ops
464.600	D743	America West Airlines
464.825M		AirTran operations
464.975R	218.1	Sun Country Airlines gate ops
466.0875M	71.9	Northwest Airlines
466.1125M	110.9	FedEx operations
466.8125	D114	Northwest Airlines hangar ops/maintenance/HVAC
466.9625M	146.2	Northwest Airlines Building 6
468.4375M	D205	Mesaba Airlines freight handlers

**Aero frequencies:**

115.300	VOR - MSP
119.300	Approach - north or east
120.000	Departure - north or east
120.300	Minneapolis Center
120.800	ATIS departure info announcements
121.200	Class B airspace - north 4500 feet and lower
121.800	Ground control - north - taxi permission
121.900	Ground control - south - taxi permission
122.200	Flight Service Station
122.300	Flight Service Station
122.550	Flight Service Station
122.950	Unicom
123.950	Tower - departure 12L/30R - westbound from east
124.700	Departure control South or West
125.000	Class B airspace - south 4500 feet and lower
125.750	Ground control - west
126.350	Approach
126.500	Class B airspace - north 4500 feet and lower
126.700	Tower - departure 12R/30L/4-22 - eastbound from west
126.950	Approach - south or north
127.925	Departure control North or East
130.550	Unknown
131.550	Unknown
133.200	Clearance delivery
133.575	Ground control pushbacks
134.450	Minneapolis Center
134.850	Minneapolis Center - out of MSP airspace
135.350	ATIS arrival info announcements

**Metropolitan Airport Commission trunked:**

Many radio users with the Metropolitan Airport Commission, which operates Minneapolis-St. Paul International Airport, have moved to the statewide digital trunked Motorola 800-MHz system. To monitor MAC airport activity, program 867.3625 in control-channel only mode.

**Talkgroups:**

10012	Airport police car to car
10794	Airport police dispatch
10796	Airport fire dispatch
10850	Airport Police 3
10852	Emergency response
10854	Airport police
10856	Airport police
10858	Airport Fire 3
10860	Airport Fire 1
10862	Airport Fire 2
10864	Airport fire all call
10866	Airport maintenance
10868	Airport airfield operations
10870	Airport airfield operations
10872	Airport airfield operations
10874	Airport airfield operations
10876	Airport operations
10878	Airport Common
10880	Airport tactical
10882	Airport tactical
10884	Airport tactical

**City of Bloomington emergency services**

Bloomington police and fire have moved to the statewide digital trunked Motorola 800-MHz system.

To monitor Bloomington public safety, program 867.3625 in control-channel only mode.

**Talkgroups:**

3426	Bloomington 911
10808	Bloomington police dispatch
10810	Bloomington fire dispatch
10926	Bloomington police car-to-car
10928	Bloomington police Special Event 1
10930	Bloomington police Special Event 2
10932	Bloomington police Traffic 1 (T1)
10934	Bloomington police Traffic 2 (T2)
10936	Bloomington police Tac 1
10938	Bloomington police Tac 2
10940	Bloomington police
10944	Bloomington police SIU
10946	Bloomington animal control
10950	Bloomington fire Event 1
10952	Bloomington Fireground 2
10954	Bloomington Fireground 3
10956	Bloomington Fireground 4
10958	Bloomington Fireground 5
10960	Bloomington Fireground 6
10962	Bloomington fire
10964	Bloomington fire
10966	Bloomington fire command
11044	Bloomington public works

**City of Minneapolis emergency services**

Minneapolis police and fire are on the statewide digital trunked Motorola 800-MHz system. To monitor Minneapolis public safety, program 867.0375 in control-channel only mode.

**Talkgroups:**

2902	Minneapolis public works - streets
2904	Minneapolis public works - water/sewer
2906	Minneapolis animal control
2912	Minneapolis city administration
2926	Minneapolis City Hall security
2928	Minneapolis common
2930	Minneapolis sanitation
2954	Minneapolis Police 1 - Third Precinct dispatch
2956	Minneapolis Police 2 - Fourth Precinct dispatch
2958	Minneapolis Police 3 - Second and Fifth Precincts dispatch
2960	Minneapolis Police 4 - overflow dispatch and events
2962	Minneapolis Police 5 - car to car
2964	Minneapolis Police 6 - traffic/parking
2966	Minneapolis Police 7 - records/warrants
2968	Minneapolis Police 8 - tactical
2970	Minneapolis Police 9 - tactical
2972	Minneapolis Police 10 - tactical
2974	Minneapolis police
2984	Minneapolis Park Police
3016	Minneapolis Fire 1 - dispatch (link to 154.340)
3018	Minneapolis Fire 2
3020	Minneapolis Fire 3 - tactical/fireground
3022	Minneapolis Fire 4 - tactical/fireground
3024	Minneapolis Fire 5 - tactical
3026	Minneapolis Fire 6 - tactical
3028	Minneapolis Fire 7 - tactical
3030	Minneapolis Fire 8 - fire prevention
3032	Minneapolis Fire 9 - training
3034	Minneapolis Fire 10 - car to car
3036	Minneapolis Fire 11 - car to car
3044	Minneapolis police - all call

**City of St. Paul emergency services****Police**

460.050R	127.3	St. Paul police - 1 west
460.125R	127.3	St. Paul police - 8 Ramsey County coop
460.150R	127.3	St. Paul police - 2 central/east (downtown)
460.225R	127.3	St. Paul police - 4 events
460.275R	127.3	St. Paul police - 6 Metro emergency
460.375R	127.3	St. Paul police - 5 info
460.425R	127.3	St. Paul police - 7 intercom to Minneapolis data
460.450R	127.3	St. Paul police - 3 car to car

**Fire/ambulance**

460.575R	162.2	St. Paul fire 1 dispatch
460.600R	162.2	St. Paul fire 3 medics
460.625R	162.2	St. Paul fire 2 fireground
462.950R	192.8	St. Paul ambulance medic control





# Scanning Oklahoma

Story and Photography by John Mayson

**T**his month we're going to visit a beautiful state in the American heartland. It's our nation's 46th state, it has more man-made lakes than any other, and, though being landlocked, it has a major port and more shoreline than the Atlantic and Gulf coasts combined.

Despite its relatively small population, the state has given us greats like Gene Autry, James Garner, Ron Howard, Chuck Norris, Tony Randall, and Garth Brooks, just to name a few. We're of course talking about the Sooner State, Oklahoma.

This month we're going to focus on two of the largest trunked radio systems in the state: The Oklahoma DPS/City of Tulsa Motorola system and the EDACS system used by Oklahoma City.

## Oklahoma DPS/City of Tulsa TRS

This is a wide-area Motorola Type II mixed-mode trunked radio system covering the I-44 corridor from Tulsa to Oklahoma City. It's used by many local, state, and even federal agencies. As of 2005 most of the talkgroups were analog and unencrypted. They have begun testing some digital talkgroups and a few sensitive talkgroups are encrypted.

At present time, the system has eleven towers. The locations and frequencies of each of these towers can be found in Table 1.

### Oklahoma Department of Public Safety (DPS)

#### City of Tulsa Trunked Radio System Frequencies (MHz)

**Bristow (Custer County):**  
856.4875, 857.4875, 858.4875,  
859.4875, 860.4875

**Carney (Lincoln County):**  
856.7125, 857.7125, 858.7125,  
859.7125, 860.7125

**Crescent (Logan County):**  
856.2375, 857.2375, 858.2375,  
859.2375, 860.2375

**Geary (Blaine County):**  
856.4875, 857.4875, 858.4875,  
859.4875, 860.4875

**Lexington (Cleveland County):**  
856.4375, 857.4375, 858.4375,  
859.4375, 860.4375

**Muskogee (Muskogee County):**  
856.2375, 857.2375, 858.2375,  
859.2375, 860.2375

**Norman (Cleveland County):**  
856.9875, 857.9875, 858.9875,  
859.9875, 860.9875

**Oklahoma City (Oklahoma County):**  
866.2375, 866.5375, 866.9250,  
867.1625, 867.4000, 867.7500,  
868.1750, 868.5500

**Okmulgee (Okmulgee County):**  
856.4375, 857.4375, 858.4375,  
859.4375, 860.4375

**Tecumseh (Pottawatomie County):**  
856.2625, 857.2625, 858.2625,  
859.2625, 860.2625

**Tulsa (Tulsa County):**  
856.4625, 856.7625, 856.9375,  
856.9625, 856.9875, 857.4625,  
857.7625, 857.9375, 857.9625,  
857.9875, 858.4625, 858.7375,  
858.7625, 858.9375, 858.9625,  
858.9875, 859.4625, 859.7375,  
859.7625, 859.9375, 859.9625,  
859.9875, 860.4625, 860.7375,  
860.7625, 860.9375, 860.9625,  
860.9875

Now that we have the frequencies, let's take a look at who uses this system. In the interest of saving space, we're only going to list talkgroups of the greatest interest to our readers, namely law enforcement, fire, EMS, and other emergency response agencies.

### Tulsa Police Department

The TPD protects and serves the city's nearly 400,000 residents with its nearly 800 sworn police officers. They are also one of the largest users of the trunked radio system. Below are the TPD talkgroups.

### Talkgroup Description

31632	Uniform Division East Car-to-Car
30736	Uniform Division East Dispatch
31152	Uniform Division East Tactical
31408	Uniform Division North Car-to-Car
31248	Uniform Division North Dispatch
31472	Uniform Division North Tactical
30800	Uniform Division South Car-to-Car
31024	Uniform Division South Dispatch
31312	Uniform Division South Tactical
30768	North
31600	South
30960	Records
31216	Records
31568	Service Side
32432	Special Operations Team
31280	Street Crimes
31344	Teletype
31120	Tulsa Police SID
30832	Utilities Talk Group
30896	Utilities Talk Group
30928	Utilities Talk Group
30992	Utilities Talk Group
31056	Utilities Talk Group
31088	Utilities Talk Group
31184	Utilities Talk Group
31376	Utilities Talk Group
31440	Utilities Talk Group
31504	Utilities Talk Group
31536	Utilities Talk Group
31664	Utilities Talk Group

### Tulsa Fire Department

TFD was organized two years before statehood and was the first fully mechanized fire department west of the Mississippi River. Today TFD boasts almost 700 paid fire fighters who protect Tulsa citizens with medical assists, HAZMAT responses, and of course, putting out fires.



Talkgroup	Description
35856	Dispatch
35888	Non-Emergency
35920	District 1 Tactical
35952	District 2 Tactical
35984	District 3 Tactical
36016	District 4 Tactical
36048	District 5 Tactical
36080	HAZMAT Tactical
36112	Airport Tactical
36144	Radio Technicians
36176	TFD
36208	TFD
36240	TFD
36272	TFD
36304	TFD

#### Tulsa Emergency Medical Services Authority

TEMSA was established in 1977 and provides emergency medical care to over 1.1 million residents throughout central and north-eastern Oklahoma. They have two divisions, the east division headquartered in Tulsa and the west division headquartered in Oklahoma City.

Unfortunately for scanner listeners in the area, all of their talkgroups are encrypted. This is perhaps to protect patient confidentiality.

#### Tulsa County Sheriff's Office

Sheriff Stanley Glanz leads the TCSO which serves as officers of the courts, running the county jail, and providing law enforcement to unincorporated parts of Tulsa County.

Talkgroup	Description
40976	Dispatch
41072	TAC 1
33808	TAC 2
33840	TAC 3
33872	Court Ops 1
33904	Court Ops 2
41040	Car to Car
41136	TCSO

41008	Service Side
41104	Link to OHP

#### Cleveland County Sheriff's Office

Cleveland County is just south of Oklahoma City and includes Norman, home of the University of Oklahoma.

Talkgroup	Description
26896	Channel A
26928	Channel B
26960	Courthouse
26992	Poss. Tactical

#### Creek County Sheriff's Office

Creek County is west of Tulsa. Sheriff Steve Toliver heads up this department that provides law enforcement protection to this growing county.

Talkgroup	Description
27408	Dispatch Channel A
27440	Car-to-Car Channel B

#### Oklahoma County Sheriff's Office

The OCSO has a single talkgroup on the system for interoperability purposes: 50160.

#### Other Law Enforcement

Several local police departments rely on this system. By participating they have easier access to county and state resources via their radios. Interoperability is a big issue facing first responders today and large, wide-area systems like this one help.

Talkgroup	Description
42544	OHP patch to Shawnee PD
48624	OHP patch to Norman PD
49648	OHP patch to Edmond PD
32784	Sand Springs PD Dispatch Channel A
32816	Sand Springs PD Car-to-Car Channel B
33232	Sand Springs PD - Special Operations Team
35600	Catoosa PD Channel A
35632	Catoosa PD Channel B
37936	Sperry PD
33296	Sapulpa PD Dispatch Channel A
33328	Sapulpa PD Channel B

#### Other Fire Departments

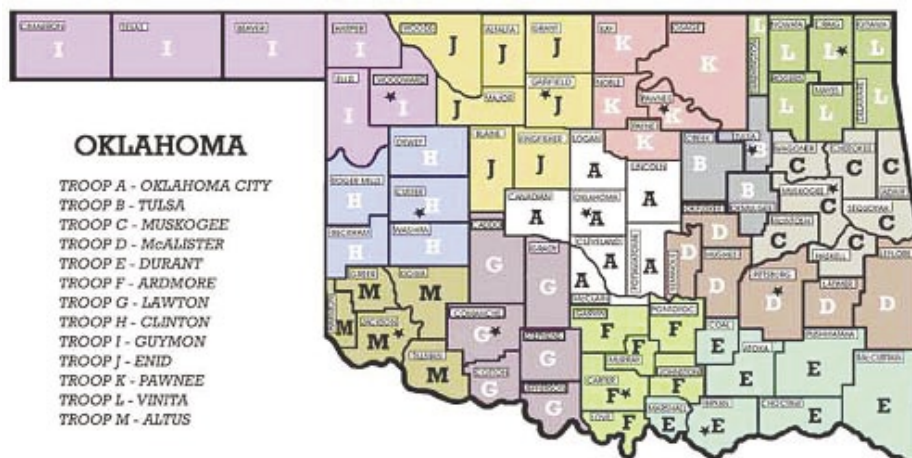
Like their law enforcement counterparts, several FDs have joined this system.

Talkgroup	Description
32848	Sand Springs FD A - Dispatch
32880	Sand Springs FD B - Car to Car
35664	Catoosa FD Dispatch
35792	Berryhill FD
28944	Oak Grove FD
33360	Sapulpa FD A - Dispatch
33392	Sapulpa FD B

#### Oklahoma Highway Patrol

OHP is the largest user of the system. They are part of the state's Department of Public Safety. As with most other state police organizations, the OHP got its start in the 1930s when cars and highways appeared across the nation's landscape. Today it's a fully equipped police force that patrols the highways, investigates accidents, and patrols lakes and waterways.

The OHP is divided into 13 patrol divisions along with two turnpike troops, and aircraft troop, executive protection, Capitol patrol, a dive team, and bomb squad.







Only troops A (Oklahoma City), B (Tulsa), C (Muskogee), ES (Executive Security), R (Capitol Police), W (Lakes) and X & Y (Turnpikes) use the system at present.

#### Troop A (Oklahoma City)

Talkgroup	Description
41680	Metro Channel 1
41712	Metro Channel 2
41776	Rural Channel 1
41808	Rural Channel 2
41936	Supervisors

#### Troop B (Tulsa)

Talkgroup	Description
34320	Channel 1
34352	Channel 2
34384	Supervisors
34416	Tulsa-area Turnpikes Channel 1
34448	Tulsa-area Turnpikes Channel 2

#### Troop C (Muskogee)

Talkgroup	Description
42256	Channel 1
42288	Channel 2
42416	Muskogee-area Turnpikes Channel 1
42448	Muskogee-area Turnpikes Channel 2

#### Troop ES (Executive Security)

Talkgroup	Description
41648	Channel 1

#### Troop R (Capitol)

Talkgroup	Description
41616	Channel 1
41840	Channel 2

#### Troop W (Lakes)

Talkgroup	Description
48784	Lake Thunderbird

#### Troops X & Y (Turnpikes)

Talkgroup	Description
42128	Turner/Kilpatrick Turnpike Channel 1
42160	Turner/Kilpatrick Turnpike Channel 2

#### Federal Government

Uncle Sam has a few talkgroups on the system, used mainly in the Tulsa area.

Talkgroup	Description
38608	United States Secret Service Channel A
38640	United States Secret Service Channel B
39344	U.S. Attorney General's Violent Crime Task Force

#### Oklahoma City TRS

Now we'll take a look at Oklahoma's largest city and state capital, Oklahoma City. The city went online with an EDACS ProVoice system in 2002. Unfortunately for scanner listeners, they're using digital and encryption, both of which are unmonitored by any off-the-shelf scanner. ProVoice is not APCO25 compliant, so today's scanners cannot decode these signals. As of November 2005, many of the talkgroups were in fact using ProVoice, but were still being simulcast. **Radioreference.com** indicates some of these talkgroups operate in mixed mode, meaning they're analog at least part time.

The system has two sets of frequencies, one for the downtown area and another set for outlying areas. Remember, this is an EDACS system, so frequencies must be entered in the correct order.

The system is used exclusively by the city of Oklahoma City. Here are some of the users.

#### Oklahoma City TRS Frequencies (MHz)

##### Central:

01 = 866.0875, 02 = 866.6125,  
03 = 867.1250, 04 = 867.6250,  
05 = 868.2500, 06 = 868.7500,  
07 = 866.1875, 08 = 866.7125,  
09 = 867.2625, 10 = 867.8500,  
11 = 868.4250, 12 = 868.9250,  
13 = 866.4375, 14 = 866.9875,  
15 = 867.5625, 16 = 868.0625,  
17 = 868.4750, 18 = 868.9750

##### Outlying:

01 = 866.3375, 02 = 866.8625,  
03 = 867.3625, 04 = 867.9000,  
05 = 868.8625, 06 = 866.4875,  
07 = 867.4750, 08 = 868.1000,  
09 = 868.7000, 10 = 866.3875,  
11 = 866.8250, 12 = 867.6625,  
13 = 868.3000, 14 = 868.8000

#### Oklahoma City Police Department

OCPD serves the city's 560,000 citizens spread across 620 square miles. At present they have a little over 1,000 sworn officers and about 300 civilian employees. OCPD is led by Chief William City.

Decimal	AFS	Description
273	02-021	Hefner Patrol Division Dispatch (simulcast on 158.970 MHz)
274	02-022	Springlake Patrol

275	02-023	Division Dispatch (simulcast on 159.090 MHz)
276	02-024	Santa Fe Patrol Division Dispatch (simulcast on 159.030 MHz)
277	02-025	Will Rogers Patrol Division Dispatch (simulcast on 158.790 MHz)
279	02-027	Bricktown Patrol Division Dispatch (simulcast on 158.730 MHz)
280	02-030	Will Rogers World Airport (simulcast on 158.895 MHz)
281	02-031	School Security
282	02-032	City Marshals
283	02-033	Records Channel 1 (simulcast on 151.310 MHz)
284	02-034	Records Channel 2
285	02-035	Investigators Channel 1
286	02-036	Investigators Channel 2
289	02-041	Supervisors
291	02-043	Emergency Management
292	02-044	Training Channel 1
305	02-061	Training Channel 2
306	02-062	Hefner Division Tactical
307	02-063	Springlake Division Tactical
308	02-064	Santa Fe Division Tactical
309	02-065	Will Rogers Division Tactical
310	02-066	Bricktown Division Tactical
311	02-067	TAC 6
312	02-070	TAC 7
313	02-071	TAC 8
314	02-072	TAC 9
417	03-041	TAC 10
418	03-042	Detectives
422	03-046	Detectives
423	03-047	Tactical Team Channel 1
		Tactical Team Channel 2

#### Oklahoma City Fire Department

Like their police counterpart, OCFD employs about 1,000 firefighters who protect the city. Every year they work 52,000 calls, 70% of which are medical assists.

Decimal	AFS	Description
529	04-021	Main Dispatch (simulcast on 453.600 MHz)
530	04-022	Station Alerting
531	04-023	Channel 1 - Southeast Fireground (simulcast on 453.150 MHz)
532	04-024	Channel 2 - Fireground (simulcast on 453.150 MHz)

		453.350MHz
533	04-025	Channel 3
534	04-026	Channel 4 - Mutual Aid (simulcast on 453.300MHz / 153.890MHz)
535	04-027	Channel 5
536	04-030	Channel 6
537	04-031	HAZMAT Materials
538	04-032	Training
540	04-034	Mutual Aid
545	04-041	Fire Marshal
548	04-044	Maintenance
550	04-046	Talk 1
551	04-047	Talk 2
552	04-050	Talk 3
553	04-051	Talk 4
554	04-052	Talk 5
555	04-053	Talk 6
556	04-054	EMSA Patch

largest in the world and home to a 24-hour beef restaurant.

The kids will love the Little River Zoo on Lake Thunderbird in Norman. While in the area, visit the Frontier City Theme Park in Oklahoma City, one of the many Six Flags amusement parks dotting the country.

Tulsa has an air and space museum that's worth a visit, especially if you're a milcom fan. It features Spartan C-2 and C-3 aircraft built

in Tulsa during the 1930s, an F-14A Tomcat, Rockwell Ranger 2000 and other locally built aircraft. Interactive exhibits for children include a T-37 cockpit trainer, wind tunnel and more.

Finally, no visit to the state would be complete without visiting the Oklahoma City National Memorial. It's a moving tribute to the victims of the bombing of the Murrah Federal Building in 1995.

We hope to see you soon in Oklahoma.

## Visiting Oklahoma

Now that you're armed with frequency and talkgroup data for the state's two largest cities, let's close with what you can do in Oklahoma.

The state has varied terrain from forests and mountains in the east to semi-arid plains in the west. It boasts beautiful lakes and rivers, so if you're interested in the great outdoors – be it camping, hiking, fishing, or hunting – this is the place to be. Remember to monitor the OHP Lake Patrol if you're near water.

If you want to experience the “old west,” stop by the Oklahoma City Stockyards. Not only is this a working stockyard, but it's the



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# A Radio Tour of Belfast Maine

By Bob Fraser

**W**elcome to Belfast, Maine! Located at the northwest corner of Penobscot Bay, it is the gateway to “Down East.”

The first settlers of this area were the Native Americans who called the area Passagassawakeag, “Place of the Sturgeons.” The first whites came here from New Hampshire in 1760, but they were soon chased out by the British during the Revolution. When they returned, the settlement became permanent.

As did many Maine seaside towns, Belfast became a large shipping and shipbuilding center. This was mostly gone by World War I, and after World War II the major industry became chicken processing, making the small city the “Broiler Capital of the World.” However, this industry collapsed in 1987 and the city of 6,500 people is now at a crossroads in its evolution.

For the visitor, there is much to do: hunting, fishing, snow sports, swimming, boating, hiking, historic tours, and boat trips of all types. There is also an historic museum, fire museum, movie house, art galleries, even a YMCA. Summer entertainment includes the Bay Festival, Arts in the Park, and the Summer Nights (music in the streets Thursday evenings). As for shopping, there are all kinds of stores here covering every imaginable product. The famous Perry’s Nut House in East Belfast is a noted example. And if nothing new interests you, there are also flea markets and yard sales.

It is very easy to get here: just take I-95 to the new exit, 113, just north of Augusta, which will put you on Route 3 and whisk you to downtown Belfast. The exits on I-95 have been renumbered to reflect the mileage from the New Hampshire line. Here’s a hint, take I-295 through Portland – it is quicker and saves on tolls. I-295 runs into U.S. Route 1 at Brunswick and by following the signs, you can either get back onto I-95 or take the more scenic but longer and slower Route 1 along the coast.

However, this article is about radio and the medium is no stranger to Belfast.

## A Radio History Tour of Belfast

In 1920, Marine station 1XR was established here, working the ships by code. The next fall, it was sold to RCA and became IXAO.

Various experiments began in 1923. Three ultra-long antennas were erected, which were developed by an RCA technician – Harold Henry Beverage (1893-1993), a local boy from nearby North Haven Island. The first experiment (and apparently the reason for RCA’s purchase), took place on March 14, 1925. Station IXAO picked

up the BBC longwave station, 5XX at Daventry, relayed it by shortwave to RCA headquarters near New York City, which then sent it via land line to their MW outlets of WJZ, Newark, N.J., and WRC, Washington, D.C. The experiment was considered a great success and a landmark in communications. However, a recording at the Belfast Museum of an early reception of jazz music is almost buried in static. In 1926, a new brick building housing 12 long wave receivers and 16 radiotelegraph transmitter-receivers replaced the modest wooden building.

Long wave for commercial broadcasting was soon considered obsolete in the U.S., and radio experimenters and commercial backers then turned to the clearer mediumwave AM band. Station IXAO was closed down and abandoned in 1929. In 1941, the Belfast Airport was built on the site and the brick radio building became part of the local National Guard Armory.

In recent years, Harold Nelson of Newport, an engineering technician for the Maine Department of Transportation, and Bruce Clark (K1FZ) of Belfast have been researching and digging up relics of this unusual station and their findings may be seen at the Belfast Museum.

In the 1980s, WBME-AM was at Belfast, and today WBFB-FM (“The Bear,” with country music) is licensed in Belfast but is actually in Bangor.

## What You’ll Hear Today

People travel with various types of radio equipment. As a guide to visitors, the following is what I am hearing with my very modest equipment covering the entire radio spectrum. Belfast is surrounded by high hills, causing many radio shadows, and propagation plays a major part in reception. More sensitive equipment will produce better results.

Long wave signals today are all aircraft non-directional radio beacons. BST on 278 kHz is the Belfast Airport. Others nearby are: LRG-216, BH-227, TSV-251, OLD-272, BH-330, BUP-348, SUH-356, AU-366, and RL-399 kHz. Recently, I heard IMR-368, the Marshfield, MA, airport quite clearly.

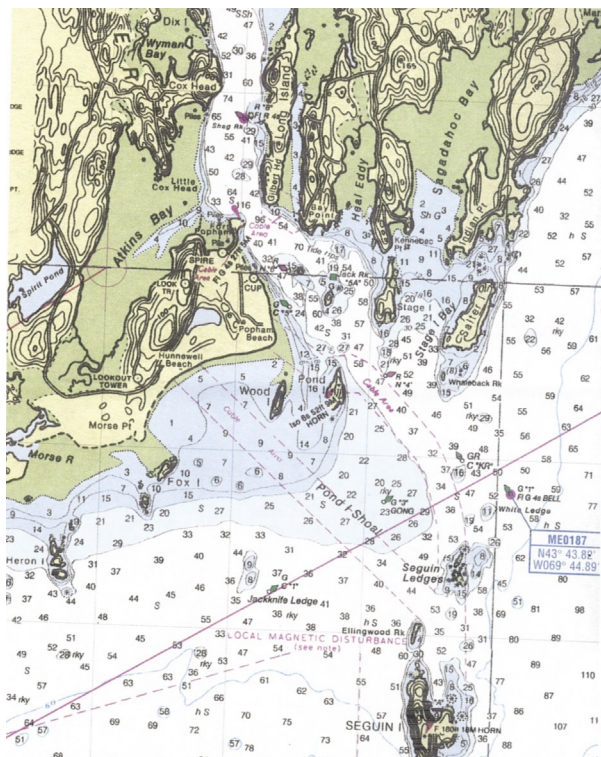
There are a number of AM stations with limited programming in this area. Sports are on 620,

900, 1160, 1280, and 1450; nostalgic music is on 730, 910, 1370, and 1470; CNN News is on 1240 and 1340; and a talk station is on 1400 kHz. Two thirds of Maine’s AM stations are 1,000 watters, while the other third are 5,000 watters. There is a 10 kW station with ESPN sports on 1160 kHz but it is daytime only. At night, it is far different. Often, there are readable signals on almost every channel including the “X” band.

There are numerous FM stations which mostly feature music. Rock music of various types is heard on 92.9, 94.5, 97.7, 100.3, 101.3, 101.7, 102.5, and 105.5. Country music can be had on 99.1, 103.3, 104.7, and 106.5. Classical music is on 106.9 and 107.7. NPR stations are 90.5 and 90.9. Folk music and jazz are featured on 89.9 MHz. A local program of interest on NPR is the “Humble Farmer,” Friday at 7 p.m. Here, one can listen to the thoughts of a real Downeaster.

TV is rarely mentioned in radio magazines, but people who would rather stay at a campground than a motel often carry a set. For those, the networks and local channel numbers are: NBC-2, CBS-5, ABC-7, PBS-12, Fox-22, WB-26, UPN-30, and PAX-33.

Although evening is the prime time for shortwave broadcasts to North America, I do most of my listening in the afternoon. Despite being beamed to Europe, the Middle East, and Africa,





the VOA, BBC, Russia, Netherlands, Bulgaria, Turkey, and Israel, for example, usually come in at armchair level. I must be too close to Canada, as reception of their signals at any time is often very poor. The beam must hop right overhead.

## Scanning

As for scanner buffs, the VHF-Lo band is primarily used by the Maine State Highway Department. The local district, headquartered at Rockland, covers from Belfast to Brunswick and is on 47.320 MHz. After fighting winter storms to get to work more years than I care to remember, it is quite a relief to stay in bed now and hear the snowplows work their way up and down the coast in blizzards.

The UHF-Lo band (450-490 MHz) is almost all business, while the 800 MHz trunked band is primarily Central Maine Power. Some safety officials have said that because of the many radio shadows here, a trunked system would not be feasible.

The VHF-Hi band is the busiest, covering just about everything here in Maine. The Maine State Police at Augusta is on 154.650, while the Orono dispatch is on 154.905. Both are heard with traffic problems on I-95. The state police frequency covering Waldo County is 155.055 MHz. The statewide fire frequency is 154.310 MHz.

Counties are the major civil division in Maine, and Belfast is the seat of Waldo County. The Waldo County Sheriff owns the busiest frequency on the whole band – 156.030 MHz.

Recently, Waldo County set up two fire areas: 159.135 is the south frequency and 153.950 is the north frequency. The county radio knits together all towns in the area for mutual aid. Oddly, the Waldo County firemen are volunteers, while the Belfast City firemen are not. Some smaller communities have neither police nor firemen and must depend on their neighbors for help. A Belfast fireman gave me the list of frequencies he has in his handheld as shown in the table. They may be small town cops and volunteer firemen, but their professionalism equals any big city force.

The Unicom at the Belfast Airport uses 122.800, while that of nearby Islesboro uses



**Belfast Town Hall**

122.900. I have been told that these two frequencies are used by the vast majority of Maine's small airports.

Tourists will be disappointed to learn that the Belfast & Moosehead Lake Railroad is no longer in Belfast. They will miss the daily run in summer and locals will miss the wonderful New Year's Eve trips. It may still run from nearby Unity to Burnham Junction and, if so, can be heard on 160.710 with the repeater on 160.385 MHz.

The spring of 2005 in Maine was quite dry in spite of all the snow and rain, and the State Forestry repeater on 159.045 MHz was busy. With numerous winter skidding accidents, the Waldo County Hospital is usually busy on their 155.355 MHz. Even the Med Flight is heard at times on 155.295.

With nearly 30 sail schooners taking tourists around the bay, numerous powered tourist craft, the usual summer yachts, fishermen, large freighters, and tankers moving in the bay and upriver to Bucksport and Belfast, the marine band is most active. The Penobscot Bay and River Pilots guiding the commercial vessels are on 156.450 and

156.500 MHz. The Maineport Towboats *Fort Point*, *Verona*, *Cape Jellison*, and *Cape Rosier*, which nudge the large ships about, are on the same frequencies. Belfast's woman harbormaster, Katy Messier, is on 156.400. The Maine State Ferries from Lincolnville to Islesboro and Rockland to North Haven and Vinal Haven Islands are on 156.950. Large ships in the bay notify boaters of their intentions on 156.650 MHz.

The Coast Guard radio station at Southwest Harbor broadcasts its marine information on 157.100 MHz at 1135 and 2335 UTC, while the powerful NOAA weather radio KEC-93 at Ellsworth broadcasts its warnings on 162.400 MHz.

Finally, a couple ham repeaters in the area provide interesting listening – 146.820 at Camden and 146.850 at Dixmont.

In one sense it is quite leisurely here; few of us work at 9 to 5 jobs. Our clocks measure a time of seasons and tides instead. But don't let the slow times fool you, for our jobs are often hard and long. But we are fiercely independent and wouldn't swap our jobs for anything. Well, for retirement maybe!



*A typical New England home? Actually, it's the Waldo County Sheriff Department and jail!*

### Belfast Fireman's Radio

159.135	Waldo County Fire, South Area
153.950	Waldo County Fire, North Area
154.310	Maine State Fire (statewide)
155.805	Belfast City Fire (and ambulance)
154.385	Town of Waldo Fire
154.145	Town of Morrill Fire
155.130	Belfast City Police (and Waldo County Sheriff tie)
156.800	Channel 16 Marine
157.100	U.S. Coast Guard

### Interesting Marine Band Frequencies

(from various sources)

Lobster boats	156.300, 156.400, 156.450, 156.625, 156.975
Private small boats	156.400, 156.425, 156.475, 156.500, 156.575, 156.600, 156.625, 156.925
Port Operations	156.275, 156.325, 156.675, 156.725



## Entry Level Ham Ticket: How Easy Do We Have It?

Over the years, the FCC, with encouragement from the ARRL, has gone a long way toward reducing the requirements to go from being a shortwave listener to an amateur radio operator. The combination of these reduced requirements and increased technology in study aides has made it possible for nearly anyone to get their entry level ham ticket in an increasingly short time. And, with the FCC's quick response license issuing policy, you could be on the air just days later. But, how does our own system stack up against entry level ham licensing in other countries? How much better (or worse) do U.S. beginners have it?

### ❖ International Cooperation and Confusion

The main reason given for easing entry into ham radio is the global phenomenon of reduced ranks among the world's hams. At first glance this would not really appear to be the case. The International Amateur Radio Union is the main source for international data regarding this hobby. Unfortunately, the most recent numbers available from the IARU are from the year 2000. Still, here are the basics: In 1965 there were roughly 400,000 licensed hams in the world. By 1995 there were 2.6 million. By 2000 the number was 2.98 million. There can be no doubt that there are well over 4 million amateur radio licenses today (there are 3.1 million licenses in Japan alone as of March 2004).

But, the statistics are wrong. No one actually knows how many licensed hams there are in the world. That may be hard to believe because everyone with a license is listed on that person's official government ham roster. How hard can it be to compile an accurate up-to-date list? Well, even the ARRL can only guess what the actual numbers are. For instance, the latest figures available from league HQ as of this writing are that there were 682,240 ham licenses issued in the U.S. as of February 2004.

But, there are thousands of licenses issued to foreign hams who hold their own national call sign and use their stateside call when they visit the U.S.\* A substantial number of hams both in the U.S. and around the world hold many valid, current licenses in a variety of countries. Furthermore, it's estimated that 10% of the 682,000 U.S. licenses are actually trustee licenses for club stations and repeaters, real, proposed or imagined. That's some 60,000 "hams" who don't actually exist, added to the thousands of foreign hams

holding additional licenses.

A look at various countries' licensing rules reveals that there could be hundreds of thousands of licenses world wide issued to hams holding other calls. As we alluded earlier, the greatest example is Japan where they make a distinction between the *Operator* license and the *Station* license. The operator license is issued for life, while the station license is issued for a 5 year term. A ham climbing the license ranks in Japan may hold four different licenses.

In addition, other licenses are issued for special geographic regions, special events, and related clubs and repeaters, all leading to a mountain of licenses for "paper" hams. And, if you consider the number of inactive hams around the world (hams who have been issued licenses but have no equipment, don't or can't operate, or have lost interest), whose calls could be in the system for up to 10 years, plus the silent keys (deceased hams whose calls remain in the system for up to 2 years), there could be additional *hundreds of thousands* of licenses inflating global ham population numbers.

And, finally, we're not getting any younger! According to the ARRL, 61% of the American ham population is over the age of 55. Only 3% are under the age of 35. The number of actual hams at the keys and mics of the world's ham shacks are indeed dwindling.

### ❖ Prying Open the Door, Country by Country

Over the course of the last decade, the world's leading amateur radio rule makers have been addressing the issue of the dwindling ham population. The first obvious solution to increasing the number of hams was to do away with the Morse code (CW) requirement for entry level licensing. Regardless of how you personally feel about this issue, 17 of the top 20 amateur radio nations have done so. Others (the U.S. among them) have a token requirement (5 words per minute) for the second level license.

I looked at the licensing rules for six countries – U.S., Canada, Great Britain, South Africa, Australia and Japan – which, when combined, account for better than two-thirds of the world's total ham population. Here's a summary of what I've found:

#### Morse Code (CW)

Most countries have done away with CW proficiency exams for the entry level license,



***CW hurdle for amateur radio entry license is removed in 17 of top 20 nations.***

while retaining CW for higher class licenses – but even then only at a rudimentary level. The UK has no CW requirement for its "Foundation License." Australia has modeled its entry license after the British, even referring to their basic license as a "Foundation" license and have the same CW rule.

Japan requires no CW for its 4<sup>th</sup> class license, but for a 3<sup>rd</sup> class ticket it requires "...receiving correctly by ear for two minutes of a European plain language text at a speed of 25 characters a minute (5 WPM)." Imagine the uproar from American hams being required to do CW in a foreign language in order to upgrade to General! Incidentally, to qualify for a Second Class ticket, Japanese hams must copy correctly European text at 9 WPM and First Class requires 12 WPM European plain language text.

South Africa retains CW as one of 5 options for entry level licensing at the licensee's choice.

#### The License Ladder

Around the world, national administrative bodies have pared license steps down to the minimum. Most have three license classes. Many have followed the British example. Hams must earn one license after the next in order to upgrade. Only the U.S. allows one to go from no license to Extra Class in a single sitting.

In South Africa, amateur radio exams are given nationally only twice a year in May and October. Miss the boat in October and you wait another seven months to take the test again.

## Age Requirement

The U.S. has no age limit on any class license. Nor does the U.K., Australia, Japan or Canada. South Africa requires a minimum age of 10 for the Class B ticket and 12 years old for the Class A licensees.

## Power Output Allowed

U.S. hams enjoy nearly unrestricted power privileges for General and Extra Class hams: 1,500 watts. Even Technician Class hams in the U.S. are allowed up to 1,500 watts on 2 meters. Of course, we must all use the "minimum amount of transmitter power required to carry out the desired communications."



*Beginning U.K. hams must use commercially made equipment at an output of no more than 10 watts and, on 10 meters, be supervised by an Intermediate or Advanced Class ham.*

Not so for the rest of the world. U. K. hams are limited to 10 watts for Foundation licensees and 400 watts for Intermediate and Advanced licenses. Similarly, Australia's hams are limited to 10 watts PEP for Foundation tickets, 100 watts for "Standard" and 400 watts for "Advanced" licensees (the top level). Fourth Class Japanese operators are restricted to 10 watts between 21 and 30 MHz and below 8 MHz. Third Class hams are allowed 50 watts, Second class 200 watts and First Class are unrestricted.

## Bands Permitted

Many nations have expanded the voice privileges for hams with higher class licenses. Canada allows SSB operations deep into U.S. CW-only territory. The U.K. restricts Foundation hams to 10 watts in the HF spectrum and in addition requires supervision by an Intermediate or Advanced class ham for operation on 10 meters.

In Japan, only Second and First Class operators have full use of the HF bands. Third Class and Fourth Class licensees are restricted to "appropriate frequencies above 18 MHz or below 8 MHz." South African hams have guidelines as to which segment of each band entry level hams may or may not operate which is similar to the old U.S. Novice restrictions. Australia, like the U.K., allows Foundation licensees to use all of the HF bands except 20 meters and they may operate SSB or CW only.

## Equipment Allowed

U.S. hams, including Technician Class, are allowed to operate virtually any equipment which transmits a pure signal. Homebrewing is encouraged and a wide range of commercially available gear is allowed. This is the same in Japan. However, U.K. and Australian rules require Foundation

licensees to use only "unmodified transmitting equipment of commercial manufacture..." though antenna experimentation is permitted.

## Fees

U.S. hams incur no cost for obtaining or renewing a license. However, there is an ARRL VE exam fee of \$14 charged. And for a "vanity" call sign, a \$21.90 fee is charged by the FCC for initial application and renewal. Canadian hams also have no fee for basic licenses, though a \$60 fee is charged for changing an existing call sign, issuing a call to a club or other organization, issuing additional call signs to hams or for special event or special prefix calls.

Japanese hams are billed 500¥ (about \$8) yearly by the Ministry of Internal Affairs and Communications for their station license. Imagine the bucks the FCC could rake in with such a scheme. And imagine the howling from the ham community at even the suggestion of such a fee. But, the Australians have it the hardest. They are charged about \$42 (U.S.) per year (including tax!) for their license, though they can get a discount by paying for 5 years.

## Mobile Operation:

An issue which is currently being discussed around the world is the operation of amateur gear while mobile. So far, only South Africa has specific rules on this subject, which is actually aimed at cell phone users. Essentially the rule is this: "No hand-held transceivers may be operated in a motor vehicle unless a headgear or vehicle mounted microphone and a speaker is used." Since 2 meter and 70 cm HTs are widely used in vehicles, this could be a real problem. The SARL is seeking clarification from the Department of Transport for an exemption in the case of amateur radio.



*South African hams aren't allowed to use HT's while mobile.*

## Last Word

There's no doubt that U.S. hams have it easy with very few restrictions regarding age, operating gear, power output and licensing fees. Take advantage of your options. If you have a Technician Class license, upgrade! If you don't have a license, what are you waiting for?

*\*For foreigners to hold a U.S. call sign they need only pass the exam and maintain a U.S. address such as a Post Office box.*

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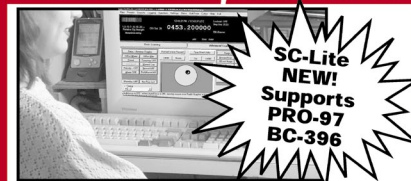
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**Q.** *I was given a scanner antenna and mounted it temporarily on my roof; it definitely improved reception. But due to restrictive covenants, I'm afraid to have it visible. What loss would I have moving it inside the attic at the same height? (Mike Ende)*

**A.** If the antenna is at the same height as it would have been outdoors, and uses identical coax, the things that can degrade its performance are shielding and reflecting effects of large masses of surrounding metal, specifically heating and air conditioning ducts, house wiring, metalized Mylar insulation, aluminum siding, gutters and downspouts, and possibly the roofing tile material (depending upon its composition).

I'd recommend you put it in the attic and try it; that's really the only way you'll know.

**Q.** *I know that too much signal may produce undesirable effects on a receiver or scanner; how do I recognize this phenomenon? (Norm Miller)*

**A.** Strong-signal overload is often the result of too large an antenna, or excessive preamplification, and may be characterized as any of the following:

- (1) Signals reappearing on multiple frequencies where they aren't actually broadcasting (intermodulation);
- (2) A general decrease in signal strengths when a larger antenna is used (desensitization or dynamic compression);
- (3) A "din" of mixed signals in the background between actual received signals (RF feed-through);
- (4) An apparent reappearance of an entire band of signals in an inappropriate part of the spectrum (IF images).

**Q.** *I have heard of MURS radios; what are they and where can I buy them? (Sterling Marcher)*

**A.** MURS (Multi-User Radio Service) was introduced by the FCC in 2000, but not with the hoopla that accompanied FRS (Family Radio Service), probably because retailers were already heavily invested in FRS transceivers.

MURS, however, is a superior service. It allows higher power (2 watts), the attachment of external antennas, and operates at a lower frequency (151/154 MHz), all of which

translate to greater range.

Although Radio Shack used to carry MURS radios, they have discontinued them. You can find these imported radios with up to 5 channels on eBay and other Internet e-commerce sites.

**Q.** *On the newer Radio Shack and Bearcat hand-held scanners with "Close Call" and "Signal Stalker" functions which allow the scanner to immediately monitor and display the frequency of any nearby transmission within its frequency range, what is the approximate distance you can expect? (Steve Rakczynski, Ludington, MI)*

**A.** I have found that they will respond with their own antenna to mobile transmitters several hundred feet away; with an outside antenna, a mile or more to base stations, depending upon signal strength. In this signal-capture mode it's not as sensitive as in its normal scanning mode, otherwise it would respond to everything within miles, and that's not its purpose.

**Q.** *Why can't I hear satellite radio on my ICOM R-3 receiver? It covers their frequency range. (Carl Cooper)*

**A.** The R-3 can only monitor analog signals; Sirius and XM satellite signals are digital.

**Q.** *Recently I purchased a used car which has heavy static on the AM band, so bad that at times it is difficult to hear the station. When the car engine is turned off there is no static. Any suggestions? (Tom Risher, KG6RVE)*

**A.** The places to look are the ignition (spark plug noise), the antenna coax (open or ungrounded shield), the alternator (whine that changes pitch with engine speed), and the fuel pump (constant whine). Be sure that the radio itself is well grounded to vehicle metal at its support point.

Make sure your vehicle is equipped with resistor spark plugs if it's ignition noise which

is being picked up by the antenna. Additional resistive, shielded spark-plug leads are available. Be sure your plugs and wiring are in new condition. If it's alternator whine, a husky capacitor (several microfarads, AC rated) across the alternator terminals should help. If it's the fuel pump, connect a 0.1 microfarad capacitor across its terminals.

For noise suppression kits, check Radio Shack, auto parts stores and the J.C. Whitney catalog.

**Q.** *I'm building a new house and plan to run several lengths of coax in the walls, terminating in a wall plate in one room where the radios will be located; I would then run a short jumper cable to run from the wall plate to each radio. Is this a good idea? (Dave Basso)*

**A.** While that's a great scheme, there are no readily-available wall plates for SO-239 connectors, so you will probably have to punch out a blank wall plate. There are plenty of wall plates, however, for and with F connectors. F-to-SO-239 adaptors are readily available, so you may wish to simply run an F-connector cable from the wall plate up to your equipment where you can attach any adaptor you want for your receiver(s).

Since you are only interested in short-wave, virtually any of the common cables (RG-58/U, RG-59/U, RG-6/U, RG-8/U, RG-8/mini, etc.) will work just fine with little to no loss at those low frequencies.

But if I were you, I'd put wall plates in all the rooms that may eventually have a need for an antenna, and run as many cables from each wall plate of all rooms to one common access point, probably in the basement or a work area. That way you can choose which rooms to feed and how to feed them, connecting antennas, splitters and preamps the most efficiently. That's how I did it in my home, and I've always been glad to have that flexibility.

And if there's even the remotest possibility that someday you might be interested in VHF/UHF scanner frequencies, use low-loss coax like RG-6/U.

Questions or tips sent to Ask Bob, c/o MT are printed in this column as space permits. Mail your questions along with a self-addressed stamped envelope in care of MT, or e-mail to [bobgrove@monitoringtimes.com](mailto:bobgrove@monitoringtimes.com). (Please include your name and address.)

**Q.** I have a new Pro-97 scanner that does trunking and I also bought the new Police Call (PC) (2005 with CD) and paid for the Win97 software to up/down load to the radio. Do you know the Frederick and Carroll county trunking types? I think I've found the type of trunk system they use, but I still have no idea how to program it in since it asks for things Police Call doesn't seem to give. For Carroll I have some 821 and 860 MHz trunking frequencies and PC says it is Motorola Type II but I have no idea how to find the "Base Freq" and offset and looking at the 821 - 823 MHz freqs shows no real "offset" I can find. – Phil K.

**A.** Both systems you are trying to trunk are Motorola Type II Analog systems. As such they do not require the spacing and offset figures as part of the setup process. Courtesy of the folks at [www.RadioReference.com](http://www.RadioReference.com), here are the frequencies you need to input. The 821-823 MHz frequencies are the inputs to the system and should not be programmed, only the frequencies below.

**Frederick County System:**

854.9875 856.4875 857.4875 858.4875  
859.4875 860.4875 866.6125 866.9125  
868.4750 868.7500

**Carroll County System:**

866.1625 867.1375 867.1875 867.2250  
867.3375 867.3875 867.4250 867.4500  
867.4750 867.5000 867.5875 867.9375  
868.3375

**Q.** Do you know where I could find up to date lists or tables on the following frequencies: Major Word Air Route Areas, SW Volmet, and Utilities? Do you know of a website or any other source on the Internet where I could get the above information? – Ian Moir

**A.** You can find information on the Major World Air Route Areas and VOLMET stations in the DoD FLIP Flight Handbook publication at [https://164.214.2.62/dafif/dafif\\_0603\\_ed8/DAFIF\\_PLAN/plan/fih.pdf](https://164.214.2.62/dafif/dafif_0603_ed8/DAFIF_PLAN/plan/fih.pdf) until 1 October 2006.

Given the demise of the World Utility News club, I can recommend Grove's Frequency Masterfile CD, or check the MT website regularly for the Hot 1000 Utility Frequencies and any new postings. Also go to <http://groups.yahoo.com/group/udxf/> where former WUN members are reorganizing.

**Q.** What's the best mobile antenna for mil-air? I listen to both vhf and uhf

mil-air band. I have a pro-2042 in my truck and use a glass mount antenna, which do well, but would a regular vertical antenna do better and what type do you use? – David Davidson, NC.

**A.** One of my favorite all-around mobile antennas is the Super Stealth Mobile Antenna (ANT26) sold by Grove Enterprises for \$19.95 plus shipping. I have used this on my car for over three years now and it provides excellent reception across the entire VHF-UHF spectrum (depending on placement on the vehicle). I have mine dead center on the roof and it gives me excellent reception off the front and rear of the car. Plus you can't beat the price.

**Q.** I just heard a MACE flight (in Bulldog MOA) push 384.67. I tried to plug it in my 895xlt and it will only take 384.675. What gives? – Barry

**A.** A common question, Barry. First, for those that do not know, the term "push" means "change frequency to..." as in, "push the buttons to change your frequency to..." MOA is the acronym for Military Operating Area. And "Mace" is the callsign for F-16s assigned to the 169 Fighter Wing/157 Fighter Squadron based out of McEntire ANG, SC. They are common visitors in the Bulldog MOA.

Frequency spacing in the civilian and military bands is 25 kHz. When a pilot is told to change frequencies to one that ends in the number 5 (i.e. 284.675 MHz), the unit passing the frequency will drop the last digit so the frequency is passed as "284.67." This has been standard procedure in the aviation community since 25 kHz spacing was introduced several years ago. Your scanner knows that this is the spacing in those bands and automatically rounds off the inputted frequency to 284.675 MHz. This allows proper reception of signals on that frequency.

**Q.** I have a strange "utility" question: do you know where exactly the Microsoft Wireless Mouse is working on 27MHz? I had the two frequencies previously, but I lost the data. – George Toth

**A.** There are quite a few varieties of wireless devices made by Microsoft. I use a Microsoft Wireless Optical Mouse V2.0 and a wireless keyboard. According to the documentation that came with my set, the wireless keyboard has two frequencies: 27.095 and 27.195 MHz. The mouse also has two channels 27.045 and 27.145 MHz. Of course, your mileage will vary depending on manufacturer and model number. I understand some of the newer wireless devices are now being placed in the 2.4

GHz band. Now if I can figure out how to get that mouse and keyboard to QSL!

**Q.** I have received a QSL for the National Hurricane Center Amateur Radio Station, WX4NHC. Freq: 14325, USB. I am not sure if this one counts as a Ham or a ute. What do you think? – Joe Wood, Greenback, Tennessee.

**A.** Definitely a ham QSL, Joe.

**Q.** On EDACS systems, the mobile unit ID displays on the base unit dispatcher's screen. How is the mobile ID transmitted to the base? Is it on the control channel data stream? Are there any scanners on the market which will display the mobile ID? – William Tobin

**A.** I checked with an expert on EDACS systems and here is his reply:

"When a mobile/portable station makes a push-to-talk (PTT) request on the control channel, the system validates the ID number, the Group number, and assigns the call to a working channel.

"Once all the radios have shifted from the control channel to the working channel (average time of 50 mS set-up time), the working channel repeater gives the requesting radio a 'go ahead' message to start transmitting. At that time, the push-to-talking radio's ID will be transmitted once to all the units on the group. If a radio late-enters into the call (i.e. - they were scanning or involved in a different call), they will late enter into the group call, but will not see the transmitting radio's ID."

As far as what a trunk tracking scanner is able to display, in normal trunk operations you will only see the talkgroup identification. You can see individual identifications when two units are using I-call, which is a one-on-one mode used on EDACS and Motorola trunk systems. Trunking expert Brian Cathcart explains how this works.

"The radio user can either select another user from a list that has been pre-programmed or enter the other radio ID himself. Each radio is given a unique ID, and on systems with Private Call (I-call), the user is told what that ID is. So, if user 'A' wants to call user 'B', user A would enter in user B's radio ID. The trunking controller will alert user B that he is being Private Called, at which point user B can acknowledge it (and the conversation becomes one-on-one) or ignore it."

These I-call identifiers can be displayed on most of our modern trunking scanners when that feature is enabled at the menu level.



## Listening Beyond Line of Sight

**A** big selling point of the large public safety radio systems is the ability of users to communicate immediately and directly, regardless of their location. This presents an opportunity for scanner listeners to hear activity occurring in distant areas, well outside normal monitoring range.

### ❖ Statewide Coverage

Dan:

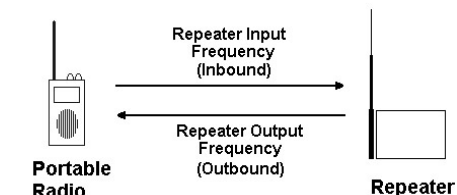
*I am very new to digital scanners; I live in southeast Michigan and have a question. From what I've read about APCO-25, I understand that the benefits of the system allow interoperability across the state. So, my thought is that a transceiver is able to communicate with anyone in the state if they choose. My question is, if I live in the Ann Arbor area, is it possible to receive digital transmissions from outside my coverage area; say Traverse County or farther?*

*I am using the Pro-96, and am receiving the Ann Arbor digital transmissions fine, but I do not know how (or if it's possible) to listen to other counties / regions in the state. Are there repeaters that I can use to get farther transmissions?*

*Any help you can provide would be great.*

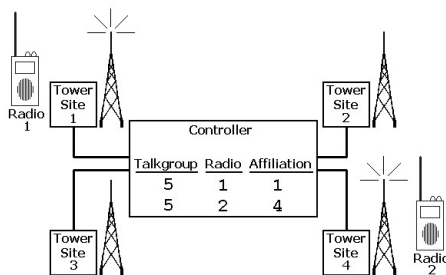
*- Jeffery near Ann Arbor*

The Michigan Public Safety Communications System (MPSCS) is a network of more than 180 repeater locations across the Lower and Upper Peninsulas. The system uses the APCO (Association of Public-Safety Communications Officials) Project 25 standards, which use digital transmissions. There



are several scanners on the market that will correctly track and monitor MPSCS transmissions.

Each repeater site on the MPSCS network transmits and receives in the 800 MHz band, on frequencies assigned by the Federal Communications Commission (FCC). These frequency assignments are paired, with one



radio frequency used for *inbound* traffic (from the radio to the repeater) and the other used for *outbound* traffic (from the repeater to the radio). Since the outbound frequency is transmitted with more power and originates from a well-placed antenna (high in the air and clear of obstructions), scanner listeners typically tune to it rather than the inbound frequency.

Each repeater site has at least one *control channel* and a number of *voice channels*.

Control channels carry data messages between radios and the repeater site. Messages on the outbound control frequency contain instructions for the radio, while messages on the inbound control frequency are usually requests and acknowledgments from the radio.

Because the outbound frequency from a repeater site has a limited geographic coverage range, a radio system like the MPSCS uses a network of repeater sites to provide complete (or nearly complete) coverage. This means a scanner listener can realistically hear the activity from a very limited number of those repeaters, typically just one or two. However, because of the way the MPSCS network (and other large trunked radio systems) operates, it is possible that a listener may hear activity from geographically distant repeaters, depending on the location of network users.

### ❖ Talkgroups

As with nearly all large public safety radio networks, conversations occurring in the MPSCS system are *trunked*. In a trunked network, voice channels are shared among all users and are dynamically assigned when needed. Instead of permanently assigning one specific channel for the police and another specific channel for the fire department and so on, as a *conventional* system might, a

trunked system maintains a “pool” of channels and assigns them on an as-needed basis during a conversation.

A conversation in a trunked system is identified by a talk group number, or *talk-group* for short. These numbers are assigned by the system designer and are programmed into each radio. A radio may have several talkgroups programmed in it, depending upon the department and job description of the radio user. For example, a police officer may have talkgroups for patrol and alerts, while a firefighter may have fire dispatch and fire-ground talkgroups.

### ❖ Affiliation

Each of the repeater sites in a radio network like the MPSCS is connected to a controller, which acts on requests from radios and issues instructions to radios. This controller is also responsible for keeping track of where individual radios are located within the network and what talkgroups are assigned to those radios.

When a radio is operating in the network, it first tunes to known outbound control channel frequencies, listening for repeater sites. When it finds the strongest one (usually the nearest one), it sends an *affiliation* message on the corresponding inbound control channel frequency. This message informs the controller what repeater site the radio is listening to and what talkgroups are programmed into the radio. The radio then listens to the outbound control frequency, waiting for instructions. All of this activity occurs automatically, without the user needing to do anything.

When a member of a talkgroup wants to communicate, he or she presses the “Talk” button. This causes the radio to send a request message on the inbound control channel frequency asking the controller for a frequency assignment. The message includes the identifying number of the talkgroup selected by the user.

When the controller receives the request message, it will find an idle voice channel frequency pair from the site that the request came from and assign it to the talkgroup. It will also check the affiliation table to see if that requested talkgroup number is associated with any of the other repeater sites. If so, the controller will assign a voice channel for each of those repeater sites as well. Once all

the frequency assignments have been made, the controller will link the voice channels together so that the voice activity from the requesting repeater is broadcast on each of the other repeater sites.

The controller then sends a message on the outbound control channel of each repeater site, instructing radios programmed with that talkgroup to tune to the assigned voice channel.

All of the activity in the previous three paragraphs typically occurs in less than one second.

At this point the requesting radio emits the "go ahead and speak" beeps, indicating that the voice channel is ready. The user wanting to talk then begins to speak. That voice traffic is repeated at the local site, but is also carried through the controller and broadcast from all of the other sites that have affiliated radios.

If you are a scanner listener located in the coverage area of one of those other repeater sites, you will hear the voice traffic from the originating location.

## ❖ Hearing Distant Voices

The MPSCS has a repeater site in Ann Arbor (Washtenaw County) that transmits on 866.0125, 866.5125, 866.8750, 867.3750, 867.8750, 868.3750, 868.8125 and 868.8750 MHz. These are the outbound frequencies for the control and voice channels.

There is a repeater site in Grand Traverse County, near the town of South Boardman, which transmits on 866.0125, 866.4750, 867.3625, 867.8875 and 868.3750 MHz.

So, Jeffery, if you're listening to the Ann Arbor site you may be able to hear activity around South Boardman if three conditions are met. First, there must be a radio programmed for a particular talkgroup affiliated with the Ann Arbor site. Second, there must be another radio programmed for that same talkgroup affiliated with the South Boardman site. And third, obviously, is that there must be activity on that talkgroup.

Many of the talkgroups on the MPSCS network are local, which makes sense since most of the public safety activity occurs in a limited geographic area. However, there some talkgroups you might want to check for that could possibly bring in activity from other repeater sites.

### Decimal Hex Description

1000	3E8	State Police All District Emergency Call
1006	3EE	State Police District 1
1007	3EF	State Police District 3
1008	3F0	Statewide MPSCS, District 1
1009	3F1	Statewide MPSCS, District 3
1010	3F2	Statewide Event 1
1011	3F3	Statewide Event 2
1012	3F4	Statewide Event 3
1013	3F5	Event 4, District 1
1014	3F6	Event 5, District 1
1015	3F7	Event 6, District 1
1016	3F8	Event 7, District 2
1017	3F9	Event 8, District 2
1018	3FA	Event 9, District 2

1019	3FB	Event 10, District 3
1020	3FC	Event 11, District 3
1021	3FD	Event 12, District 3
1022	3FE	Event 13, District 4
1023	3FF	Event 14, District 4
1024	400	Event 15, District 4
1025	401	Event 16, District 5
1026	402	Event 17, District 5
1027	403	Event 18, District 5
1028	404	Event 19, District 6
1029	405	Event 20, District 6
1030	406	Event 21, District 6
1031	407	Event 22, District 7
1032	408	Event 23, District 7
1033	409	Event 24, District 7
1034	40A	Event 25, District 8
1035	40B	Event 26, District 8
1036	40C	Event 27, District 8
1047	417	State Police Crime Laboratory
1048	418	State Police Crime Laboratory
1104	450	Criminal Investigation Division, District 1
1105	451	Department of Natural Resources Statewide
1136	470	Michigan National Guard
1137	471	Michigan National Guard
1138	472	Michigan National Guard
1139	473	Michigan National Guard
1140	474	Michigan National Guard
1141	475	Michigan National Guard
1142	476	Michigan National Guard
1220	4C4	Michigan National Guard
1221	4C5	Michigan National Guard
1244	4DC	Emergency Services Unit, Statewide 1
1245	4DD	Emergency Services Unit, Statewide 2
1246	4DE	Emergency Services Unit, Training 1
1247	4DF	Emergency Services Unit, Training 2
1261	4ED	State Police Aviation Division
1262	4EE	State Police K9 Teams
1289	509	Department of Natural Resources Statewide
1455	5AF	Statewide Emergency 1
1456	5B0	Statewide Emergency 2
2005	7D5	State Police District 2
2006	7D6	Statewide MPSCS, District 2
2044	7FC	State Police Narcotics 1
2045	7FD	State Police Narcotics 2
2046	7FE	State Police Narcotics 3
2047	7FF	State Police Narcotics 4
2089	829	Gaming Control Board, Primary
2162	872	Criminal Investigation Division, District 3
2176	880	Gaming Control Board 1
2177	881	Gaming Control Board 2
2178	882	Gaming Control Board 3
2179	883	Gaming Control Board 4
3003	BBB	State Police District 5
3004	BBC	State Police District 6
3005	BBD	Statewide MPSCS, District 5
3006	BBE	Statewide MPSCS, District 6
3053	BED	Criminal Investigation Division, District 5
3054	BEE	Criminal Investigation Division, District 6
4002	FA2	State Police District 7
4003	FA3	Statewide MPSCS, District 7
4016	FBO	Criminal Investigation Division, District 7

6002	1772	State Police District 8
6003	1773	Statewide MPSCS, District 8
7008	1B60	Criminal Investigation Division, District 8

## ❖ Michigan State Police

The Michigan State Police is organized into "districts," six in the Lower Peninsula and one in the Upper Peninsula. Each District has several "posts," out of which Troopers operate. As you monitor the MPSCS, listen for District and Post identifiers that are outside your local area.



### District/Area Posts

1	South Central	Adrian, Brighton, Ithaca, Jackson, Jonesville, Lansing, Lansing Capitol Post, Owosso
2	South East	Detroit, Groveland Team, Metro North, Metro South, Monroe, Richmond, Ypsilanti
3	East Central	Bad Axe, Bay City, Bridgeport, Caro, East Tawas, Flint, Gladwin, Lapeer, Sandusky, West Branch
5	South West	Battle Creek, Bridgman,

### PAR ELECTRONICS EF-SWL



The Par EF-SWL is an end-fed short wave antenna optimally designed for 1-30 MHz reception. The radiator is 45 feet of genuine #14 gauge black polyethylene coated Flex-Weave wire (168 strands of #36 gauge woven copper). This material is very strong yet can easily be coiled like a rope for portable work. The UV resistant matchbox houses a wideband 9:1 transformer wound on a binocular core. Unlike other transformers, external stainless studs on the matchbox allow the user to configure the primary and secondary grounds for best noise reduction at their particular location. Output is via a silver/teflon SO239 connector.

**Par EF-SWL** Order #2205 \$57.95

Universal also carries the **Par MON3** omni VHF-UHF base antenna and **Par RF filters**.

Note: Orders under \$100 ship UPS for only \$6.95.

**Universal Radio**  
6830 Americana Pkwy.  
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◆ Info: 614 866-4267  
◆ Fax: 614 866-2339

**www.universal-radio.com**



Coldwater, Hastings, Paw Paw, South Haven, Wayland, White Pigeon

- 6 West Central Grand Haven, Hart, Ionia, Lakeview, Mt. Pleasant, Newaygo, Reed City, Rockford
- 7 North Alpena, Cadillac, Cheboygan, Gaylord, Houghton Lake, Kalkaska, Manistee, Traverse City, and Petoskey
- 8 Upper Peninsula Calumet, Gladstone, Iron Mountain, Iron River, L'Anse, Manistique, Munising, Negaunee, Newberry, Sault Ste. Marie, St. Ignace, Stephenson, Wakefield

### ❖ Michigan Emergency Management

MPSCS isn't the only system that may have distant activity. There are other frequencies you can check to hear activity going on outside your local area.

The Emergency Management and Homeland Security (EMHS) Division of the Michigan State Police are licensed for some very low band (shortwave) frequencies, listed below. On March 1 the former Emergency Management Division (EMD) changed to EMHS, reflecting their increased responsibilities since 9/11. EMHS is involved in numerous activities across the state, whether emergencies or not. During Superbowl XL, for instance, EMHS employees helped provide security before, during, and after the game at Ford Field in Detroit. You can read more about the organization on the web at: [www.michigan.gov/emd](http://www.michigan.gov/emd)

Frequency	Description
2.32740	Michigan EMHS
2.41540	Michigan EMHS
2.80540	Michigan EMHS
5.14140	Michigan EMHS
7.47840	Michigan EMHS
7.80640	Michigan EMHS

Frequencies that most scanners can actually tune to include the following:

#### Frequency Description

39.82	Michigan State Police Mutual Aid
151.055	Michigan Department of Transportation
151.085	Michigan Department of Transportation
151.115	Michigan Department of Transportation
155.865	Michigan Emergency Public Safety System

### ❖ Oklahoma

In March the Oklahoma Senate passed Bill 1030, which will provide funding to build a statewide 800 MHz radio network for public safety agencies. The Bill is named after two law enforcement officers, Oklahoma Highway Patrol Trooper Matt Evans and Oklahoma City Police Officer Jeff Rominger, who both died when their cars collided during a pursuit. The sponsor of the Bill, State Senator Kenneth Corn, believes that if an interoperable radio network had been in place, the fatal collision could have been avoided. The core of the Bill is simple and straightforward:



Upon receipt of sufficient monies appropriated for such purpose, the Department of Public Safety is authorized to do all things necessary to acquire a statewide 800 megahertz public safety communication system including, but not limited to, purchasing real property and constructing facilities necessary for the operation of such system.

The Oklahoma House passed a corresponding Bill in April.

The statewide communications system is intended to allow local, state and federal agencies to communicate directly with each other rather than through dispatchers. This should provide better response during natural disasters and would have been a big help during the recent wildfires.

The Oklahoma Highway Patrol currently uses a trunked radio system around the cities of Oklahoma City and Tulsa (See this month's feature on Oklahoma). In other areas, base stations transmit on 44.70 and 45.22 MHz. In many rural locations coverage is poor, so a series of repeaters re-transmit the low band signals up into VHF and UHF bands.

A schedule for construction and installation of the new statewide system has yet to be created, but if the Bill

becomes law, the funding effort will start in November.

### ❖ Uniden Firmware Update

Owners of the Uniden BCD396T scanner may be interested to know that there is a firmware update available. The BCD396T was introduced last summer as a "third generation digital" handheld scanner capable of monitoring APCO Project 25 systems as well as the most common analog trunked radio systems.

The firmware upgrade includes improved performance of the automatic gain control (AGC), providing better audio level balance and reducing the need to constantly tweak the setting. Additional settings at low volume levels were added, making it easier to find a comfortable setting. Other changes and fixes are mentioned in a release document accompanying the upgrade.

The firmware upgrade is available on the Uniden web site at:

[www.uniden.com/index/downloads.cfm?product=BCD396T](http://www.uniden.com/index/downloads.cfm?product=BCD396T)

You will first need to download and install the Firmware Update Loader application, which is available on the same web page as the upgrade. At the time of publication the Loader was named:

**Install\_BC\_VUP\_v1.0.0.8.exe**

Download this executable and run it. Then, download and unzip the upgrade file:

**BCD396T\_V1\_11\_03.zip**

Run the Firmware Update Loader application and follow the directions. If all goes well, the upgrade should take about five minutes. A couple of hints, if you run into trouble: First, it's best if no other software is running when you attempt the upgrade, especially programs that might try to use the serial port. Second, be sure to follow the instructions about removing the batteries. Press the [L/O] and [6] buttons while plugging in the power connector. If the blue backlight is on and the screen is blank, the scanner should be ready to accept the update.

### ❖ GPS-Enabled Scanner

Uniden is continuing to work on their next scanner, the BCD996T, which will incorporate support for an external GPS (Global Positioning System) receiver. When connected to a GPS receiver, the BCD996T will automatically turn on and off radio systems based on your location. You can read more about the scanner at:

[www.uniden.com/products/productdetail.cfm?product=BCD996T](http://www.uniden.com/products/productdetail.cfm?product=BCD996T)

Watch for a review of the BCD996T coming up in the July issue of *Monitoring Times*.

That's all for this month. More information, links and frequencies can be found on my web site at [www.signalharbor.com](http://www.signalharbor.com). I also welcome your questions, comments and activity reports via electronic mail to [danveeneman@monitoringtimes.com](mailto:danveeneman@monitoringtimes.com). Until next time, happy scanning!





# Big Savings on Radio Scanners

## Uniden® SCANNERS



### Bearcat® 796DGV Trunk Tracker IV with free scanner headset

Manufacturers suggested list price \$799.95  
CEI Special Price \$519.95

1,000 Channels • 10 banks • CTCSS/DCS • S Meter  
Size: 6 1/16" Wide x 6 1/16" Deep x 2 3/8" High

Frequency Coverage: 25,000-512,000 MHz., 806,000-956,000 MHz.  
(excluding the cellular & UHF TV band), 1,240,000-1,300,000 MHz.

When you buy your Bearcat 796DGV TrunkTracker package deal from Communications Electronics, you get more. The GV means "Great Value." With your BC796DGV scanner purchase, you also get a **free deluxe scanner headphone** designed for home or race track use. Headset features independent volume controls and 3.5 mm gold right angle plug. The 1,000 channel Bearcat 796DGV is packed with features to track Motorola Type I/II/III Hybrid, EDACS, LTR Analog Trunk Systems and Motorola APCO 25 Phase I digital scanner including 9,600 Baud C4FM and CQPSK. Also features control channel only mode to allow you to automatically trunk many systems by simply programming the control channel, S.A.M.E. weather alert, full-frequency display and backlit controls, built-in CTCSS/DCS to assign analog and digital subaudible tone codes to a specific frequency in memory, PC Control and programming with RS232C 9 pin port (cable not supplied), Beep Alert, Record function, VFO control, menu-driven design, total channel control and much more. Our CEI package deal includes telescopic antenna, AC adapter, cigarette lighter cord, DC cord, mobile mounting bracket with screws, owner's manual, trunking frequency guide and one-year limited Uniden factory warranty. For maximum scanning enjoyment, order magnetic mount antenna part number ANTMMBNC for \$29.95. For complete details, download the owners manual from the [www.usascan.com](http://www.usascan.com) web site. For fastest delivery, order on-line at [www.usascan.com](http://www.usascan.com).

### Bearcat® BCT8 Trunk Tracker III

Manufacturer suggested list price \$299.95

CEI Special Price \$169.95

250 Channels • 5 banks • PC Programmable  
Size: 7.06" Wide x 6.10" Deep x 2.44" High

Frequency Coverage: 25,000-54,000 MHz., 108,000-174,000 MHz., 400,000-512,000 MHz., 806,000-956,000 MHz., 849,0125-868,9950 MHz., 894,0125-956,000 MHz.

The Bearcat BCT8 scanner, licensed by NASCAR, is a superb preprogrammed 800 MHz trunked highway patrol system scanner. Featuring TrunkTracker III, PC Programming, 250 Channels with unique BearTracker warning system to alert you to activity on highway patrol link frequencies. Preprogrammed service searches makes finding interesting active frequencies even easier and include preprogrammed police, fire and emergency medical, news agency, weather, CB band, air band, railroad, marine band and department of transportation service searches. The BCT8 also has preprogrammed highway patrol alert frequencies by state to help you quickly find frequencies likely to be active when you are driving. The BCT8 includes AC adapter, DC power cable, cigarette lighter adapter plug, telescopic antenna, window mount antenna, owner's manual, one year limited Uniden warranty, frequency guide and free mobile mounting bracket. For maximum scanning enjoyment, also order the following optional accessories: External speaker ESP20 with mounting bracket & 10 feet of cable with plug attached \$19.95. Magnetic Mount mobile antenna ANTMMBNC for \$29.95.



### Bearcat® BCD396T Trunk Tracker IV

Suggested list price \$799.95/CEI price \$519.95

APCO 25 9,600 baud compact digital ready handheld TrunkTracker IV scanner featuring Fire Tone Out Paging, Close Call and Dynamically Allocated Channel Memory (up to 6,000 channels), SAME Weather Alert, CTCSS/DCS, Alpha Tagging. Size: 2.40" Wide x 1.22" Deep x 5.35" High

#### Frequency Coverage:

25,000-512,000 MHz., 764,000-775,9875 MHz., 794,000-823,9875 MHz., 849,0125-868,9765 MHz., 894,0125-956,000 MHz., 1240,000 MHz - 1300,000 MHz.

The handheld BCD396T scanner was designed for National Security/Emergency Preparedness (NS/EP) and homeland security use with new features such as **Fire Tone Out Decoder**. This feature lets you set the BCD396T to alert if your selected two-tone sequential paging tones are received. Ideal for on-call firefighters, emergency response staff and for activating individual scanners used for incident management and population attack warning.

**Close Call Radio Frequency Capture** - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. Useful for intelligence agencies for use at events where you don't have advance notice or knowledge of the radio communications systems and assets you need to intercept. The BCD396T scanner is designed to track Motorola Type I, Type II, Hybrid, SMARTNET, PRIVACY PLUS, LTR and EDACS analog trunking systems on any band. Now, follow UHF High Band, UHF 800/900 MHz trunked public safety and public service systems just as if conventional two-way communications were used. **Dynamically Allocated Channel Memory** - The BCD396T scanner's memory is organized so that it more closely matches how radio systems actually work. Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 3,000 channels are typical but **over 6,000 channels are possible** depending on the scanner features used. You can also easily determine how much memory you have used and how much memory you have left. **Preprogrammed Systems** - The BCD396T is preprogrammed with over 400 channels covering police, fire and ambulance operations in the 25 most populated counties in the United States, plus the most popular digital systems. **3 AA NiMH or Alkaline battery operation and Charger** - 3 AA battery operation - The BCD396T includes 3 premium 2,300 mAh Nickel Metal Hydride AA batteries to give you the most economical power option available. You may also operate the BCD396D using 3 AA alkaline batteries. **Unique Data Skip** - Allows your scanner to skip unwanted data transmissions and reduces unwanted birdies. **Memory Backup** - If the battery completely discharges or if power is disconnected, the frequencies programmed in the BCD396T scanner are retained in memory. **Manual Channel Access** - Go directly to any channel. **LCD Back Light** - A blue LCD light remains on when the back light key is pressed. **Autolight** - Automatically turns the blue LCD backlight on when your scanner stops on a transmission. **Battery Save** - In manual mode, the BCD396T automatically reduces its power requirements to extend the battery's charge. **Attenuator** - Reduces the signal strength to help prevent signal overload. The BCD396T also works as a conventional scanner to continuously monitor many radio conversations even though the message is switching frequencies. The BCD396T comes with AC adapter, 3 AA nickel metal hydride batteries, belt clip, flexible rubber antenna, wrist strap, SMA/BNC adapter, RS232C cable, Trunk Tracker frequency guide, owner's manual and one year limited Uniden warranty. Not compatible with AGEIS, ASTRO or ESAS systems. Order on-line at [www.usascan.com](http://www.usascan.com) or call 1-800-USA-SCAN.



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The handheld BC246T TrunkTracker scanner has so many features, we recommend you visit our web site at [www.usascan.com](http://www.usascan.com) and download the free owner's manual. Popular features include **Close Call Radio Frequency Capture** - Bearcat exclusive technology locks onto nearby radio transmissions, even if you haven't programmed anything into your scanner. **Dynamically Allocated Channel Memory** - Organize channels any way you want, using Uniden's exclusive dynamic memory management system. 1,600 channels are typical but **over 2,500 channels are possible** depending on the scanner features used. You can also easily determine how much memory is used. **Preprogrammed Service Search (10)** - Makes it easy to find interesting frequencies used by public safety, news media TV broadcast audio, Amateur (ham) radio, CB radio, Family Radio Service, special low power, railroad, aircraft, marine, racing and weather frequencies. **Quick Keys** - allow you to select systems and groups by pressing a single key. **Text Tagging** - Name each system, group, channel, talk group



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## Radio Z-Signals



**Z**-signals are radio communications operating codes. Like the better-known Q-signals, they are used for brevity and clarity of procedure, but they aren't published nearly as much. They're perceived as "old" and kind of arcane. However, some radio services still use them, and they remain confusing to beginners.

### ❖ History

Z-signals began as an internal operating code for commercial traffic handling at Cable & Wireless, the British telegraph giant which has evolved into a major telecom player today. The name, from 1934, reflected a 1929 merger of British wired and radio telegraphy companies.

Military organizations chose to adapt the Z-code to their needs rather than tweak the Q-code, which was already becoming specialized to civilian aero and maritime mobile use. (Today's Q-signals come from the International Civil Aeronautics Organization and the International Telecommunications Union.)

The resulting Z-code was completely different from C&W's. It appears in United States joint Army/Navy field manuals starting in or before the 1940s. In World War II, most Allied military operators had at least a working familiarity with both the Q- and Z-codes.

The Z-code has been changed regularly ever since, to reflect new technologies. In English, its current military incarnation is published by the Combined Communications-Electronics Board (CCEB). CCEB members are Australia, Canada, New Zealand, United Kingdom and the United States, though the North Atlantic Treaty Organization (NATO) commonly adopts the result. CCEB puts out a number of unclassified Allied Communications Publications (ACPs). The Z-code is listed in section 2B of ACP 131, revision F of which came out right at press time in April of 2006.

ACP 131 is known to radio operators worldwide. It also contains the civilian Q-code and other operating procedures. One will continue to see paper or electronic copies wherever radio stations are operated by people instead of machines. Tell you a secret, though... the machines incorporate formats from the various ACP documents in their software as a "legacy" mode.

### ❖ Usage

Most people are familiar with the use of Q-signals as questions or informational statements. For example, QRU? means "Have you anything (usually traffic) for me?" while QRU alone means

"I have nothing for you." Z-signals can have an interrogative form, too, although only a few of the couple hundred existing signals actually use one.

Along with the question mark, an interrogative can also be sent with "INT," which goes before the signal. INT ZBZ, for example, is a request for a signal report on how accurately a teleprinting signal is showing at the other end. Most of the time, such information can be quantified on a 1 through 5 scale, 5 being best.

Currently, signals ZAA through ZZZ are authorized for communication between any allied stations using this standard. ZYA through ZZZ are reserved for the internal use of individual nations.

Often, different blocks of signals are for different purposes. Some are very arcane, for semaphore, hoisted flags, or flashing light signals. Others pertain to such familiar modes as radiofacsimile and radioteletype. A few refer to the latest spread-spectrum and satellite modes.

A few signals at the ends of alphabetical blocks are currently unassigned in ACP 131(F). Also, the Russian military uses some different signals, and there are also some occasionally used by civilian radio services which differ from the military meanings. Meanwhile, the many French military stations heard on shortwave are especially heavy users of all ACP-standard radio procedures.

A Z-signal list that includes all of these is on the Web, at [www.kloth.net/radio/](http://www.kloth.net/radio/). This site also has a complete list of Q-signals, some of which also get very specialized, and other great radio references. ACP 131(F) and many other unclassified communications publications can be obtained at [www.jcs.mil/j6/cceb/acps/](http://www.jcs.mil/j6/cceb/acps/)

### ❖ Common Signals

Z-signals appear a lot in message headers. The ZNx block pertains to communication security, and the ZNR/ZNY procedure is common. ZNR means that a message is safe to forward "without change by radio or non-approved circuit." ZNR is typically followed by "UUUUU," the procedural signal for "Unclassified." ZNY is followed by five repetitions of the letter pertaining to its classification, and informs the operator that the message may not be forwarded "unencrypted by radio or non-approved circuit."

A commonly misunderstood signal is ZEN, which means about the same thing as "cc:" does in an e-mail. It is not a mystical Eastern religion, but neither is it an instruction to relay the message. ZEN plus an addressee or callsign means that the message has already been sent to that station, and so they will also be seeing it.

The French like to put "ZUI" in their test loops and markers. It's not a routing signal at all. It means, "Your attention is invited to..." followed by a test code or general call.

ZKR shows up in Canadian military channel markers, meaning "I am maintaining watch on ... kilohertz." This is followed by the current listening frequencies.

Finally, ZCZC is not a Z-signal at all, but the Telex standard code for start of message. Similarly, NNNN is end of message.

### ❖ Other Signals

ZAN... Transmit only messages of and above precedence....  
ZAX.....You are causing interference. (Number 1-6 = type)  
ZBO?...Of what precedence(s) and for whom is (are) your message(s) ?  
ZBO....I have (or...has)... message(s) for you (or for...).  
ZBV.....Answer me (or ...) on ...  
ZBZ?...What is the printing acceptability of my signals (or those of...)?  
ZBZ.....The printing acceptability of your signals (or those of...) is... (1-5)  
ZDG ...Accuracy of following message is doubtful.  
ZEH .....Accuracy of portion of following message is doubtful.  
ZEI.....Accuracy is doubtful of heading. Check with originating station.  
ZEV?...Request you acknowledge message.  
ZEV.....Message is acknowledged.  
ZFD ....This message is a suspected duplicate.  
ZFG ....This message is an exact duplicate, and is to be delivered.  
ZHQ ...Please listen for me on ... and transmit to me on ...  
ZKN....I have taken over guard on...  
ZPW....This message canceled at time indicated. File without transmission.  
ZRA?...How does my frequency check?

### ❖ Editor's Note

After deadline for this column, some very shocking and saddening news came via e-mail. The Worldwide Utility News (WUN), an international online radio club with an extremely large and diverse membership, has ceased to exist effective April 15, 2006. The reason given for its demise is a familiar one: lack of volunteers who could meet the time demands of keeping such a comprehensive effort going. This hobby is not a large one, but it is close-knit, and a good friend is gone.

Bravo Zulu (good job), WUN, you will be missed. This column will, of course, make its own attempt to fill the gaping hole. We invite any and all logs be sent directly to [utilityworld@ominous-valve.com](mailto:utilityworld@ominous-valve.com) or [hughstegman@monitoringtimes.com](mailto:hughstegman@monitoringtimes.com). Much more on this next month.

### ABBREVIATIONS USED IN THIS COLUMN

AFB.....	Air Force Base
ALE.....	Automatic Link Establishment
AM.....	Amplitude Modulation
ARQ.....	Automatic Repeat Request teleprinting system
AWACS.....	Airborne Warning And Control System
CAMSLANT.....	Communication Area Master Station, Atlantic
CAMSPAC.....	Communication Area Master Station, Pacific
COTHEN.....	Customs Over-The-Horizon Enforcement Network
CW.....	Morse code telegraphy ("Continuous Wave")
DSC.....	Digital Selective Calling
E10a.....	Israeli English phonetic "numbers" variants
EAM.....	Emergency Action Message
FAX.....	Radiofacsimile
FEC.....	Forward Error Correction teleprinting system
HFDL.....	High-Frequency Data Link
HF-GCS.....	High-Frequency Global Communications System
MARS.....	US Military Affiliate Radio System
Meteo.....	Meteorological
MFA.....	Ministry of Foreign Affairs
MFSK32.....	32-tone Multi-Frequency-Shift Keying
PR.....	Puerto Rico
PSK31.....	31-baud Phase-Shift Keying, used by amateurs
RTTY.....	Radio Teletype
Selcal.....	Selective Calling
SITOR-A.....	Simplex Teleprinting Over Radio, ARQ mode
SITOR-B.....	Simplex Teleprinting Over Radio, FEC mode
STANAG.....	Standardization Agreement (4285 is a data mode)
UK.....	United Kingdom
Unid.....	Unidentified
US.....	United States
USCG.....	US Coast Guard
V2a.....	Cuban Spanish "Atencion," 3-message variant

All transmissions are USB (upper sideband) unless otherwise indicated. All frequencies are in kHz (kilohertz) and all times are UTC (Coordinated Universal Time). "Numbers" stations have their ENIGMA (European Numbers Information Gathering and Monitoring Association) designators in ().

2182.0	Halifax Coast Guard Radio-Canadian CG, NS, announcing listening frequencies at 0653. (Tom Severt-KS)
2187.5	V3XA-Vessel San Diego, DSC distress call at 0302. (Day Watson-UK)
2598.0	Labrador Coast Guard Radio-Canadian CG, weather at 0705. (Severt-KS)
2749.0	Halifax Radio-Canadian Coast Guard, weather at 0243. (Severt-KS)
2813.9	MTI-UK Royal Navy Plymouth, RTTY channel availability marker at 1934. (Watson-UK)
2840.7	Unid-German Coast Guard, SITOR-A selcal to IMXU, at 2022 and 2023. (Watson-UK)
2845.0	PBB-Dutch Navy, Den Helder, RTTY channel availability marker at 1930. (Watson-UK)
2899.0	Reach 764-US Air Force Air Mobility Command transport, handed off by Gander to Shanwick on 5616, at 0916. (Allan Stern-FL)
3000.0	Unid-Strange signal alternating tones 3 kHz apart, nightly at 0600. (Severt-KS)
3161.0	XSS-Unknown "XSS net," ALE sound at 2347. (Watson-UK)
3227.4	XSS-Unknown "XSS net," ALE sound at 1952. (Watson-UK)
3230.0	KPA G1O2O3D4N5I6G7H8T-Abnormal Israeli Intelligence callup (E10a) spells "GOODNIGHT," parallel 5339 at 2238. (Ary Boender-Netherlands) [Authentic. It's apparently spy humor. -Hugh]
3308.1	AF3FM-US Air Force MARS, net at 0310. (Severt-KS)
3360.0	VLB A1Z2B8Z2-Abnormal Israeli Intelligence callup (E10a) at 1718. (Boender-Netherlands)
3476.0	Ascot 2624-UK Royal Air Force transport, oceanic air traffic control with Gander at 0550. (Stern-FL)
3476.0	Gander-Oceanic air control, Canada, position from Continental 96, at 0320. (Severt-KS)
3488.0	"XBC"-Unknown CW station sending weather in Spanish at

3782.0	0325, switched to voice at 0351. (Severt-KS) [Probably Colombian aero. -Hugh]
	CTP-Oieras Naval, Portugal, RTTY marker at 0719. (Severt-KS)
4000.0	AAM4TAL-US Army MARS net, PSK31 at 0327. (Severt-KS)
4028.0	Cuban AM "numbers" (V2a), in progress at 0640. (Severt-KS)
4146.0	India Charlie-US Navy carrier group air defense net, working Delta at 2223. (Mark Cleary-SC)
4166.3	XSS-Unknown "XSS net," ALE sound at 0857. (Watson-UK)
4226.5	XFY-Unknown, calling XSS, ALE at 0817. (Watson-UK)
4372.0	"9-T-G"-US Navy, Link-11 coordination with "E-2-U," other trigraph calls, at 2307. (Cleary-SC)
4414.0	Echo Fox-US Navy link coordination net control, working Kilo at 0751. (Severt-KS) Echo Foxtrot, working Golf, Hotel, "B-5-J," and Kilo, at 2051. (Cleary-SC)
4418.0	FDUM-Abnormal Israeli callup (E10a), at 1755. (Boender-Netherlands)
4456.0	FUKQ-Unknown CW, 5-letter Cyrillic groups to 6XNP at 2009. (Watson-UK)
4585.0	998NHQ-US Civil Air Patrol, calling 999NHQCAP, ALE at 0241. (Watson-UK)
4706.0	"M-8-J"-Unknown US military, passing a report to Silent Warrior at 2244. (Cleary-SC)
4739.0	Fighting Tiger 67-US Navy P-3C, working Fiddle (Jacksonville, FL), at 0245. (Cleary-SC)
4815.5	PGID-Serbian Army, ALE and data with 4NTR, at 1914. (Watson-UK)
4924.0	WARSZAW-Polish Ministry of Information, working MOBILE2 in ALE at 1931, calling WAR9 at 1953. (Watson-UK)
5170.0	VLB A1Z2B8Z2-Abnormal Israeli callup (E10a), at 1655. (Boender-Netherlands)
5230.0	MIW A10B11C10-Abnormal Israeli callup (E10a), at 1831. (Boender-Netherlands)
5320.0	USCG Cutter Shearwater, position report to SFO Eastern Shore (Sector Field Office, Chincoteague, VA) at 2255. (Cleary-SC)
5406.0	CLC51-Venezuelan Military, Caicara, calling SCLC512, ALE at 0236. (Watson-UK)
5547.0	Reach 6E1-US Air Force contract transport, selcal and position for San Francisco, at 0644. (Stern-FL)
5550.0	New York-Caribbean oceanic air control "A" net, working Delta 38 at 0144. (Jeff Seale-KY)
5600.0	3201-Iraqi Police, ALE sounding at 0155. (Watson-UK)
5708.0	Unknown-US Air Force autopatch circuit left open, repeating automated weather for Tinker AFB, at 1735. (Severt-KS)
5732.0	Service Center-US Customs, radio check with P-3 Omaha 5CS on the COTHEN net, at 1411. (Cleary-SC)
5902.0	S10-Algerian National Security Department, working A20 in ALE, also on 5902, at 0630. (Watson-UK)
5907.0	LCR154-Polish Military Headquarters, Warsaw, calling ETD165 in ALE, at 0644. (Watson-UK)
6243.0	XFY-Unknown, calling XSS, ALE at 1347. (Watson-UK)
6314.0	NMF-USCG, Boston, MA, SITOR-B Hydrolant bulletin advising of a distress beacon activation, at 0225. (Seale-KY)
6317.5	NOJ-USCG, Kodiak, AK, CW identifier in SITOR-A phasing marker, at 0430. (Seale-KY)
6532.0	VS0022-Virgin Atlantic Airways flight 22, HFDL position for Shannon, at 0020. (Seale-KY) A9-CHMK-Bahrain Airlines flight 1, HFDL position for Bahrain, at 0657. (Patrice Privat-France)
6673.0	San Francisco-Pacific oceanic air control, position from Northwest 904 at 0415. (Severt-KS)
6694.0	Rescue 323-Canadian C-130, patch via Halifax Military to Halifax Rescue Coordination Centre, getting doctor's instructions for Rescue 903, at 0009. (Cleary-SC)
6695.4	"E-6-F"-Unknown military, calling "M-8-A" at 2226. (Cleary-SC)
6697.0	One Punch-US military "Nightwatch" net, EAM at 0651. (Severt-KS)
6712.0	"03"-HFDL Ground Station, Reykjavik, Iceland, also listening on 8977 and 15025, logging on Cargolux flight 796, hex address 4D010A (Boeing 747 freighter LX-UCV), at 1543. (Watson-UK)



- 6761.0 Ethyl 63-US Air Force Air Mobility Command KC-135 tanker, scheduling air refueling with transport Reach 9061, at 0523. (Cleary-SC)
- 6792.0 2528-Moroccan Department of National Security, working 2527, ALE at 0015. (Watson-UK)
- 6796.0 TWVE2-Spanish Guardia Civil, Navarra, calling TWVZ2, ALE at 0433. (Watson-UK)
- 6855.0 Cuban AM "numbers" (V2a), callup 04501 71131 88441, at 2100. (Cam Castillo-Panama)
- 7527.0 CAMSLANT-USCG, Portsmouth, VA, search and rescue with helicopter Juliet 04 on COTHEN, at 0023. (Cleary-SC)
- 7632.0 NNN0KAG-US Navy/Marine Corps MARS, net at 1733. (Sevart-KS)
- 7681.0 Cuban AM "numbers" (V2a), 5-number groups in progress at 1035. (Castillo-Panama)
- 7701.5 Unid-Irish Navy vessel, selcal to XFSM, SITOR-A at 2318. (Watson-UK)
- 7887.0 Cuban AM "numbers" (V2a), callup 04501 71131 88441, at 2001. V2a, started broadcast in the middle (omitting callup), at 2008. (Castillo-Panama)
- 7975.0 Unmodulated carrier at 1557, then two test groups from Cuban AM "numbers" station, finally V2a callup 68222 76021 43481 and messages, at 1600. (Sevart-KS)
- 8010.0 Cuban AM "numbers" (V2a), 5-number groups in progress at 1727. (Sevart-KS)
- 8097.0 Cuban AM "numbers" (V2a), callup 99932 21082 67282, at 1805 and 1900. (Castillo-Panama) Cuban AM "numbers" (V2a), in progress at 1823. (Sevart-KS)
- 8431.0 TAH-Istanbul Radio, Turkey, CW identifier in SITOR-A marker at 0135. (Seale-KY)
- 8463.0 CKN-Canadian Forces, Vancouver, BC, RTTY marker at 0150. (Seale-KY)
- 8464.0 Lincolnshire Poacher-British Intelligence (E03), callup 52149, also 10426 and 11545, at 1600. (Boender-Netherlands)
- 8502.0 NMN-USCG CAMSLANT, VA, "Perfect Paul" voice synthesized weather at 1615. (Sevart-KS)
- 8631.0 ZSJ-South African Navy, Silvermine, in MFSK32, at 1040. (Bob Hall-RSA)
- 8682.0 Unid-Moscow Meteo, FAX weather chart at 1520. (Hall-RSA)
- 8788.0 WLO-Mobile Radio, AL, voice synthesized weather at 1618. (Sevart-KS)
- 8825.0 New York-North Atlantic oceanic air control "E" net, working KLM 736 at 0125. (Seale-KY)
- 8834.0 A7-AED-Qatar Airlines flight 850 (Airbus A330), HF DL position for Johannesburg at 0623. (Hall-RSA)
- 8912.0 TSC-US Customs Service Center, calling 474FEMAUX (WGY9474, Federal Emergency Management Agency Auxiliary Station, possibly IA), COTHEN at 1903. (Glenn Blum-TX)
- 8971.0 Fighting Tiger 21-US Navy P-3C, reporting bad engine to Golden Hawk (Brunswick, ME), at 1615. (Cleary-SC)
- 8992.0 Bolt 31-US Air Force tanker, exercise traffic with Bolt 89 and Bolt 83, at 1330. Death 06-US Air Force B-2, radio check with Andrews at 1342. (Jeff Haverlah-TX)
- 9110.0 NMF-USCG, Boston, MA, FAX charts at 1943. (Watson-UK)
- 9134.7 Unid-Station with slow, hand-sent, frequency-shifted Morse, rogering traffic at 1545. (Watson-UK)
- 9892.0 CFH-Canadian Forces, Halifax, NS, RTTY weather on new frequency in the broadcast band, at 2035. (Watson-UK) [Confirmed CFH simulcast here, with fax and RTTY. Odd frequency choice. -Hugh]
- 9973.0 Unid-Mixed CW numbers and letters, considerable heterodyne with WWCR broadcast, also heard on 9985, at 1943. (Fred Lesnick-Canada)
- 9996.0 RWM-Russian CW standard time station, Moscow, at 1328. (Watson-UK)
- 10610.9 Moscow Meteo, Far East FAX chart at 1500. (Watson-UK)
- 10626.0 RFFXL-French detachment in United Nations Interim Force, Naqoura, Lebanon, ARQ at 1633. (Watson-UK)
- 10715.0 Cuban AM "numbers" (V2a), callup 25362 18411 77131, at 1300. (Castillo-Panama)
- 10945.0 CFH-Canadian Forces, Halifax, NS, RTTY marker at 1553. (Watson-UK)
- 10995.0 RBT-Algerian Embassy, Rabat, Morocco, ALE to Algiers, then Skyfax and Arabic relays from NKT (Nouakchott, Mauritania), at 1627. (Watson-UK)
- 11175.0 Ranger 33-US Marine Corps KC-130T, patch via Puerto Rico HF-GCS to Ops in Fort Worth, TX, at 2031. (Cleary-SC)
- 11175.0 Doom 94-US Air Force B-52H, patch via McClellan HF-GCS to Mudbug Control (Barksdale AFB, LA) for in-flight emergency for overheating #5 engine, at 0144. "9-U-D"-US Military, patch via Puerto Rico to relay an Esteem Highly Alpha message, at 2059. (Haverlah-TX)
- 11184.0 CO0079-Continental Airlines flight 79, HF DL position for Reykjavik at 1232. (Watson-UK)
- 11220.0 Key Ring-US military (Nightwatch net), voice and data with Andrews for two hours starting at 1740. (Haverlah-TX)
- 11232.0 SAM 9960-US Air Force, Special Air Mission, Distinguished Visitor flight, patch via Trenton Military to Andrews Command Post at 1449. Sentry 40-US Air Force AWACS, patch via Trenton for weather, at 1916. Sentry 20, patch via Trenton to Raymond 24 (Tinker AFB, OK), for weather at 1948. (Larry Van Horn-NC)
- 11327.0 Canforce 556-Canadian Forces, getting weather from Trenton at 1812. (Sevart-KS) Chalice Foxtrot-US Air Force E-3 AWACS, patch via Trenton to Deer Hunter (North American Aerospace Defense Command, Western Sector, WA), at 2129. (Cleary-SC)
- 11330.0 CO0060-Continental Airlines flight 60, HF DL position for "05," Auckland, NZ, at 0600. (Privat-France)
- 11545.0 New York-Atlantic oceanic air control, getting position from Delta 2067 at 1900. (Sevart-KS)
- 12333.0 Lincolnshire Poacher-British Intelligence (E03), callup 68376, also on 13375 and 15682, at 1900. (Boender-Netherlands)
- 12603.0 XJV-Unknown, calling XSS, ALE at 1519. (Watson-UK)
- 12745.5 Lincolnshire Poacher-British Intelligence (E03), callup 13173, at 1700. (Boender-Netherlands)
- 12750.0 JJC-Tokyo Radio, Japan, Kyodo News FAX (60 lines per minute), at 1535. (Hall-RSA)
- 12855.0 NMF-USCG, Boston, FAX weather charts at 1830. (Sevart-KS)
- 13089.0 6WW-French Navy, Dakar, Senegal, calling vessel FX in STANAG 4285, then back to marker at 1509. (Watson-UK)
- 13200.0 NMN-USCG CAMSLANT, VA, "Perfect Paul" weather voice at 1600. (Sevart-KS)
- 13215.0 Puerto Rico-US Air Force HF-GCS, working Reach 366 at 2038. (Cleary-SC) Puerto Rico, 28-character EAM with automated weather audio underneath, also on 11175 (weaker), at 2052. (Haverlah-TX)
- 13303.0 Unknown-Probably US Air Force, patch to Hilda Meteo (Scott AFB, IL) for weather at McGuire AFB, NJ, at 1720. (Sevart-KS)
- 13306.0 "17"-HF DL ground station, Canary Islands, also on 21955, position from CLX710 (Cargolux), at 1522. (Watson-UK)
- 13354.0 New York-Atlantic air control, clearing Air France 653, at 1740. (Sevart-KS)
- 13354.0 New York-Atlantic air control, position from KLM 785, at 1908. (Sevart-KS)
- 13354.0 New York-Atlantic air control, position from Speedbird 2155 (British Airways), at 1622. (Sevart-KS)
- 13927.1 Reach 340-US Air Force transport, MARS patch to Nevada Air National Guard, Reno, at 1657. Teal 88-US Air Force Reserve "Hurricane Hunter," MARS patch to National Hurricane Center, FL, at 1828. (Stern-FL)
- 13927.1 AFA2XZ-US Air Force MARS, working unheard station at 1950. (Sevart-KS)
- 13956.6 UJL-Tunisian Diplomatic, calling JB8 in SITOR-B, at 1859. (Watson-UK)
- 14510.0 XSS-Unknown "XSS net," ALE sound at 1745. (Sevart-KS)
- 14996.0 RWM-Russian CW standard time station, Moscow, at 1413. (Watson-UK)
- 15016.0 Offutt-US Air Force HF-GCS, NE, with EAM "for Allotment" (Nightwatch net), at 1520. (Sevart-KS)
- 15016.0 Hathaway-US military (Nightwatch net), EAM and "Standing by for traffic, at 1620. Andrews, US Air Force HF-GCS, different (20-character) EAM at 1648, before Hathaway's rebroadcast of the first one at 1650. (Haverlah-TX)
- 15025.0 AY1556-Finnair flight 1556, HF DL position for Reykjavik at 1308. (Watson-UK)
- 15043.0 Sentry 61-US Air Force AWACS, patch to Raymond 24 (Tinker AFB, OK), at 1643. (Sevart-KS)
- 15988.0 DDK7-Hamburg Meteo, FAX, charts at 1023. (Watson-UK)
- 16060.0 Unid-UK Military, Cyprus, in MFSK32 at 1600. (Hall-RSA)
- 16814.5 CBV-Valparaiso Radio, Chile, SITOR-B navigation warnings at 1430. (Watson-UK)
- 16830.5 SVO-Olympia Radio, Greece, CW identifier in SITOR-A marker, at 1604. (Hall-RSA)
- 16914.0 KSM-Maritime Radio Museum, Pt. Reyes, CA, CW marker also on 6494 and 12993, at 2224. (Sevart-KS)
- 18261.0 GYA-UK Fleet Weather and Oceanic Centre, Northwood, FAX charts at 1503. (Watson-UK)

## Egyptian Digital Review

We experience slim pickings this listening season in the daytime as the sunspot cycle bottoms out and the static crashes and bangs disturb our nighttime meandering across the HF digital bands. We'll tell you what we know about Egyptian use of the spectrum and where to tune.

### ❖ Egyptian Diplomatic Communications

With what must be one of the longest running diplomatic networks, MFA Cairo and embassies have been a mainstay of the digital utility frequencies for many decades. Despite dabbling in more modern equipment like the Codan 16 tone modem and others, the network continues to make use of their ancient SITOR-A gear using the ATU-80 Arabic alphabet.

The network has for years also followed a simple rule for channel selection: any frequency will do! The logbooks here at Digital Towers contain no less than 327 frequencies used since 1996, and doubtless that is merely a fraction of the total.

Here's how the network operates using SITOR-A, and often when using the other equipment, too. In the call-up phase, the embassy or MFA either selcalls (select calling) the remote end using SSxx, XBxx or TVxx series selcalls or uses SITOR-B with a message like this:

```
FFMMFMFMFMFMFMFMFMFMFJG RKUKGK
KPJOW ODS
5509 5509 5509 YALR 5/5
MFMFMFMFMFM RKUKGK KPJOW ODS
5509 5509 5509 KY KY KY KY
```

This means that the MFA is listening for the embassy in Havana ("rkukgk" in ATU-80 Arabic) on 9055 kHz carrier frequency (Arabic numbers print backwards) or add 1.7 kHz for the center of data frequency. After the call-up, traffic usually proceeds using plain text ATU-80 Arabic or less frequently, using off-line encryption. Message formats feature a standard header with sender and recipient information as follows (again, note Arabic numbers are reversed):

```
yfasr xtusr faj 61/32 0041 81/4/6991 (Message
date and time)
=====
jg yphkg :- xgo--ke (from: Embassy Sanaa)
kds bkfqsr kdakr-fr (to: MFA Cairo)
```

Most locations can easily be deciphered using various ATU-80 to ASCII translation tables such as that found in Klingenfuss' *Radio Data Code Manual* and also at Utility Monitoring Central (see Resources).

Here are some recently active frequencies:

7821.7, 8015.7, 8024.7, 9056.7, 10177.7,  
10226.7, 16356.7, 17451.7, 18241.7,  
18251.7, 18326.7, 18716.7, 19146.7,  
20281.7 kHz

### ❖ Egyptian Army and Navy

Despite a fairly extensive Navy and Air Force, no HF digital activity has been attributed to either of these organizations.

There are, however, oft-heard channels using a distinctive ARQ-E system using the unusual speed of 46.1bd with 170 Hz and a 4-character repetition cycle. The signals on 3667.2, 5403.8 and 6801.5 kHz are believed to be from Egyptian airfield defense systems and have been heard within the last few months. Messages are short and infrequent, for example:

```
shyshy hs.s.600 lahs.600 22 92016 m 64011
hdme oyr ms.nfe 00000000000alfhs.alm-
stmr0000000000000000 almraqb nnnnnnnn
```

The same organization is also believed to have been responsible for a VFT multichannel system using the same speed and which has been silent for some time now.

### ❖ Egyptian Border Guard

Another more recently established network, this time using MIL-188-141A ALE to trigger Codan modems and heard in both clear and scrambled voice, has been attributed to Egyptian Border Guards. The ALE identifiers used are in the 12xx and 13xx series and the frequencies used include (kHz USB):

5792, 5804, 6918, 8600, 8650, 9200, 9224,  
10206, 10617, 13499, 14740, 16240,  
18257

### ❖ More XNet Mail Channels On-Line

A few months ago, we profiled new "email at sea" provider XNet. As expected, we've monitored more of their licensed frequencies coming on-line, including 8035.1, 8080.1 and 9115.1 kHz (center of data). Again, we've yet to hear any traffic, but listen out for the channel free signals and "XNET" CW callsign after every round.

### ❖ ALE-based State Emergency Networks

We continue to be amazed at the development of post-9/11 statewide HF-based "emergency" networks here in the US.

First came the New Hampshire network. This operates on the following frequencies and links various towns throughout the state:

2414.0, 5135.0, 5136.6, 5192.0, 5193.4,  
7805.0, 7806.4 kHz USB

BE1RL Berlin

CE1NT	Centerville
CO1NC	Concord
HI1LL	Hillsborough
KE1EN	Keene
LA1NC	Lancaster
MI1LF	Milford
NA1SH	Nashua
PE1TE	Peterborough
RO1CH	Rochester
WPFJ25	New Hampshire State EOC, Concord NH

We continue to find new stations and frequencies used by Texas in what appears to be a public health-related network:

4442.0 USB, 4757.0 USB, 5823.0 LSB, 8026.0  
LSB, 9414.5 USB, 10202.0 USB, 11488.0 LSB,  
12167.0 LSB, 13488.0 USB, 18267.0 LSB,  
20662.0 LSB

The stations and locations involved are: AUSTIN, ELPASO, LUBBOCK, HARLINGEN, HOUSTON, SANANTONIO, TEMPLE and TYLER. A number of the stations appear to coordinate with "ATLANTACDC," the Centers for Disease Control in Atlanta, GA.

### ❖ Antenna Update

In a recent *MT*, Bob Grove reviewed the Comet CHA250B HF vertical antenna. Quite by coincidence, we recently installed the very same antenna here at Digital Towers, replacing an aging 70ft long wire. We thought it would be useful to have a broadband no-tune HF transmitting antenna with good characteristics for listening in the winter while we waited for Spring and the opportunity to raise a 200ft dipole.

The antenna is very elegant and sturdy, and so unobtrusive it practically disappears into the sky. It took all of about 10 minutes to build in the basement and about 40 minutes to install atop a 20ft aluminum pipe attached to our steel well head. Somewhat surprisingly, the antenna easily outperforms the longwire and is noticeably quieter. Although a quick standby here, the antenna is a perfect solution for anyone short on antenna space.

That's it for this month; please send along your emails and letters with any questions or topics you would like to see covered in forthcoming columns.

### Resources:

MFA Cairo - [www.chace-ortiz.org/umc/mfa-text/Egypt.txt](http://www.chace-ortiz.org/umc/mfa-text/Egypt.txt)  
Comet CHA250B - [www.cometantenna.com/pdf\\_review/Comet-CHA250B-Review.pdf](http://www.cometantenna.com/pdf_review/Comet-CHA250B-Review.pdf)



## BBC Insults Shortwave Listeners, Cuts More English and Spanish

BBC World Service listeners in North America who had resigned themselves to hearing it only during certain hours from relays in French Guiana, Bonaire and Delano, were in for a rude surprise as the A-06 season began. Although these had continued to appear on advance schedules, almost all of them were cancelled, leaving only four transmissions, all of them intended only for the Caribbean.

So this is all that's left of BBCWS on SW to any part of the Americas: 11-13 11865, 21-22 15390, 22-23 5975; also M-F 21-2130 11675.

Richard Cuff, who has been following the decline of the BBC World Service for years, reported on the swprograms list: There were approximately 66.7 daily transmitter-hours targeting the Americas and the Caribbean before July 2001. Now there are 4.5 daily transmitter-hours. That's a 93.3-percent reduction.

All this is hardly surprising, given the following from Bill Bergada-

no: I do the correspondence for the SWL FEST; each year it gets rougher to get things from some broadcasters. In 2005, I decided to contact Bush House for some promo material, figuring there's a chance maybe they will send something. What I got in reply should point out how closed-minded they are:

"We have \*absolutely\* no intention of dealing with people who \*insist on\* listening to an OLD antiquated mode such as shortwave." It was signed (electronically of course) "audience relations BBC World Service Bush House London, England." Bill says, "That is a coward who hid behind the name of the BBC."

Hmm, better get "SWL" out of the name of the Fest? BBC Spanish service also got cut: had planned to be on four frequencies at 00-01, and four more at 03-04, but wound up with only two at 03-04, 7325 and 6110.

**AFGHANISTAN** Difficult to get an ID on 9345, but at the end of B-05, the channel was clear at 16-17 with IDs as "Inja Radyo Solh Bagram," 1630 news or information. They have long music segments, some talk programs and Afghanistan info spots (Jari Savolainen, Finland, DX LISTENING DIGEST)

[non] R. Solh, A-06 relayed back from outside: 02-09 11665, 09-12 11675, both via UAE, 250 kW, 45 degrees; and 12-18 17700 via Rampisham UK, 500 kW, 85 degrees (Wolfgang Büschel, BCDX) 17700 often audible here; enjoy the music (gh, OK)

**ALASKA** KNLS A06 English hours as shown on their Chinese website: 08 UTC 11870 kHz, 10 9795, 12 9615 & 9780, 14 9795 (via Eric Zhou, China, DXLD) Surely will be making intra-seasonal changes every month or two, but none shown (gh) 08 heard on 11765, not 11870 (Erik Køie, Denmark, ibid.)

**ANTARCTICA** 15476, LRA 36, Radio Nacional Arcángel San Gabriel, had been off the air for months and did not answer e-mail, so I asked Gabriel Iván Barrera in Argentina to phone them. Said they had antenna problems but would return April 17, M-F 18-21 (Manuel Méndez, Spain, DXLD)

**BOLIVIA** Although it started in December, the first known DX report of R. Logos, 6165, did not come until March 22: Heard with a program in Guarany from R. Transmundial at 1045-1058, then R. Logos ID; also in daytime at 1803 relaying HCJB news. Much weaker than R. Santa Cruz in same town on 6135 (Rogildo F. Aragão, Quillacollo, Bolivia, DXLD)

A few days later, threshold signal in Spanish, so presumed, 1007-1035 (Chuck Bolland, FL, ibid.) Same morning until 1100 with Catholic talk, tentative (Arnaldo Slaen, Argentina, HCDX) Thought they were Protestant (gh) Another morning at 0950 but dead air from 0954 (Bolland, DXLD) Very weak here same date at 0950 on 6165 (Arnaldo Slaen, Argentina, condig list)

5680.7, Radio La Voz del Campesino, Sipe Sipe, 2215-2230\*, Aymara, musical program. I listened to this every day in a week and didn't hear a clear ID, only mention of Sipe Sipe several times; sign-on is around 0945-0950 and sign-off without announcement between 2200 and 2240 (Nicolás Eramo, Argentina, DXLD) Still heard with a good signal on 5680.68, booming in from a few minutes before 1000 in Quechua (Arnaldo Slaen, Argentina, condig list)

**BULGARIA** R. Bulgaria A-06 English, all 500 kW via Plovdiv, 306 degrees except 5800 295 degrees: WEu 0630-07 9500 11500, 1130-12 11700 15700, 1730-18 9500 11500, 21-22 5800 7500. NAm 23-24 & 02-03 9700 11700 (DX Mix News, R. Bulgaria)

**CAMEROON** [non] Radio Free Southern Cameroons, A-06: 1800-1900 on 15695 Sundays, English to Africa (TDP website, via Eric Zhou, China, DXLD) It's 500 kW via Armavir, Russia, 235 degrees (Wolfgang Büschel, BCDX) Poor and weak in noise, sign-on with choral anthem, talk about Southern Cameroon, local and religious music (Brian Alexander, PA, DXLD)

**CHINA** [and non] As suspected last month, heavy Chinese jamming on 17310 and 18160 was against a clandestine, but not an unknown one: Sound of Hope, which had been using several lower frequencies. According to S. Aoki, Japan, Sound of Hope was running from 23 to 13 on 18160 with 100 kW, 325

degrees, from Tanshui, Taiwan, and the CNR 1 jamming was based in Nanning. The jamming was much more widely heard than SOH, reported by Olle Alm, Sweden, Adán Mur, Paraguay, Mauno Ritola, Finland. Then frequencies kept changing and along with them the jamming, to 17350, 17330, 18180, back to 18160, tracked by German Amateur Radio Club intruder watchers (via BCDX)

On April 10, Xiaoxu Lin, Executive VP of Sound of Hope gave Media Network a schedule lacking these frequencies, disinformation? 22-23 9635, 22-24 Sat/Sun 6280, 23-24 7310, 11-13 7280, 13-14 7310, 13-16 9450, 16-17 11765 (gh)

**COLOMBIA** [and non] La Voz de tu Conciencia reactivated 6010 on March 27, heard at 0701-0805, "desde Colombia para el mundo, transmite Alcaraván Radio, La Voz de tu Conciencia," eclipsing Mexico's Radio Mil (Manuel Méndez, Spain, DXLD) Go to <http://www.fuerzadepaz.com> for webcast of Garita Radio, which will soon replace Marfil Estéreo on 5910 (Rafael Rodríguez R., Colombia, condig list) Marfil reactivated April 1 on 5909.92, at 0630-0700+ with IDs, camp music, but not the next night (Brian Alexander, PA, DXLD) Had not been heard since January 7, has commercials (Manuel Méndez, ibid.) 5910 also at 0043 with heavy jamming (José Bueno, Spain, Noticias DX) The jamming is Cuban against R. República on its new A-06 frequency, even on the weekends when RR is not on, just as was done on ex-7160 (gh)

**CROATIA** [non] Croatian Radio, Zagreb, via Germany, was on the hamband 7285 during B-05, but for A-06 back to 9925, 22-05 on 9925, with overlapping emissions from three transmitters at two sites: 22-03 Wertachtal to SAM; 23-03 Wertachtal to ENAm; 01-05 Nauen to WNAW; also 04-07 9470 Wertachtal to NZ, 06-10 13820 Jülich to Au (T-Systems via Kai Ludwig, DXLD) Really smooth; I never hear any echoes so DTK must take some trouble to be sure audio and frequencies are synchronized. Mostly Croatian, but some English and Spanish (gh)

**CUBA** [and non] Radio and TV Martí: Washington Guns after Castro at Any Cost: <http://snipurl.com/ocjb> (Council for Hemispheric Affairs via Mike Barraclough, DXLD)

The R. República service via Rampisham, UK, continued in A-06 on same schedule as B-05: 22-24 6135, 00-02 7205, 02-04 7110. Separate RR via WRML via Nauen, Germany, M-F 23-04 Tue-Sat moved from 7160 to 5910 March 27 (DTK via Kai Ludwig) And changed target from "Iceland" to Caribbean. Hope all those *dentrocubanos* in Iceland can still hear it! (gh) Cuban jammers caught up with 5910 on March 30 (Mark Taylor, WI, DXLD) See also USA: WRML. Then Marfil Estéreo reactivated 5910 April 1, see COLOMBIA, facing not only RR 5 days a week, but jamming 7 days a week, clear after 0400 (gh) Alternate RR via Germany is 9470 (Wolfgang Büschel, ibid.)

**EGYPT** R. Cairo English to ENAm at 2300 on 11950; music audio was 40-60% (Bob Thomas, CT, DXLD) Advance A-06 schedule still showed 11885. Took them a year to end the collision with WYFR on 11885, and now 11885 is

open. 11950 with better modulation on music than talk; at 2302 gave program summary in Cairo time only. 0030 into Arabic with time signal half a minute late (gh) 11950 runs until 0430, from Abu Zaabal, 500 kW, 330 degrees (Wolfgang Büschel, BCDX)

**FRANCE** [non] RFI via French Guiana on 9800 at 0100, March 29, in Spanish, an eclectic, moody mix, one of the very best mu-

*All times UTC; All frequencies kHz; \* before hr = sign on, \* after hr = sign off; // = parallel programming; + = continuing but not monitored; 2 x freq = 2nd harmonic; A-06=summer season; [non] = Broadcast to or for the listed country, but not necessarily originating there; u.o.s. = unless otherwise stated*

sic programs on shortwave – absolutely don't miss it; stunning, perfect signal (Eric Bryan, WA, DXLD) Fill music during a strike, not a recurring program. RFI does list 10- or 15-minute musical segments on Sat and Sun broadcasts in Spanish. No change in Spanish, but new frequency schedule shows further cuts in French on SW to the Americas. A year ago, there were 2.5 hours local mornings, 0.5 hours evenings. Now only one hour remains, at 1130-12 on 13640, 15365, 17800 and 1330-14 on 15515 (Mike Cooper, ibid.)

An article in the newspaper *Libération* (sent by someone at RFI via Wolfgang Büschel) was a fascinating look at the use of part-timers and contract workers at RFI. I'd heard RFI was low-paying, but \$600 to \$1,400 a month to live in Paris? The disconnect between various language services seems evident based on listening to the English service, which seems to have nothing to do with RFI's French-language output. It's sad to think that such a fine product as RFI's 24-hour French service is produced on the back of slave wages. Who can blame them for doing on strike for a few days? (Mike Cooper, GA, DXLD)

**GABON** At about 1445 March 21, I checked 17630 for Africa Numéro Un and for the "wandering African music jammer" [against Sawt Al-Amal, see LIBYA] which was on 17685. Both frequencies were in parallel with the same music. I had two radios on, side by side, to be sure about it. This continued to 1503 when there was silence for a few seconds on 17630 followed by news in French and normal programming. Meanwhile 17685 continued until 1530 with the usual music. So this leaves no doubt that the music on the "jammer" is from Gabon (Bernie O'Shea, Ontario, DXLD)

Good work! First confirmation of what we have long suspected (gh) Extremely interesting! Who pays for this jamming? And why does Gabon agree? (Erik Koie, Copenhagen, ibid.) I doubt that Gabon as a country cares, or even knows, as the facility is essentially a French entity. Ask why FRANCE agrees (gh)

They were caught in their own trap (or game) by mistake. Who pays for this jamming? That's our next task to find out. And Gabon is involved just because someone is paying for transmitter time. Business is business, after all (Raúl Saavedra, Costa Rica, ibid.) Hearing this in parallel with ANO is very good monitoring – sooner or later something occurs to give away the identity of stations like this. I agree that using Gabon facilities will be a business deal and not a political one. Obviously someone has been coordinating the jamming. The French equivalent of the CIA might know something about it (Noel R. Green, UK, ibid.)

The owner of these facilities appears to be Africa Média S.A., the French company behind Africa No. 1. However, the HFCC registrations for all but the NHK transmissions were done by TDF, so I assume that Africa Média contracted the operation of the Moyabi transmitters to TDF. Now Libya is a good customer of TDF's shortwave transmission department, using quite a lot of airtime on their otherwise idle Centre E plant at Issoudun. But they still seem to hesitate from doing this kind of dirty work from French soil, i.e. Issoudun (Kai Ludwig, Germany, ibid.)

**GERMANY** T-Systems and its parent Deutsche Telekom AG have completed the sale of the Jülich SW transmission facility to Christian Vision, UK. Jülich, in NW Germany, is recognized as one of the leading transmission sites in Europe, equipped with [twelve] 100 kW analogue and digital (DRM) transmitters and numerous antennas with global reach. T-Systems, Media&Broadcast, will continue to service clients at Jülich until the end of 2007 at which time Christian Vision will take full operational control. CVC intends to use the site for analogue and DRM in numerous languages to Europe, Africa, Middle East, Russia and West Asia (Media Network blog)

Presumably will knock off all the dozens of relays currently via Jülich (gh) It is rather disturbing how German transmission infrastructure will be sold out this way. This explains why some of the relays have already been moved to Wertachtal and Nauen, but can they handle the load, or will DW itself cut back further its own SW transmissions? The IBB sites at Lampertheim and Biblis may also become involved (Kai Ludwig, Germany, DXLD)

[non] Recommended show on DW: A World of Music, Tue 0530 on 15410 via Madagascar, or more reliably Mon 2130 on 11865, 15205 via Rwanda; one episode we heard was about new music from Japan (gh)

**GHANA** Despite several checks mornings and evenings, nothing heard on 4915 (Gerhard Werdin, touring Gambia in Feb-Mar, BC-DX) Another country gone from SW, at least for now (gh)

**GREECE** [and non] Contrary to our guess last month, *Hellenes Around the World* summer timing on VOG is 14-15 Sat, via Delano 9775, direct on 15630, 12105, 9420 (via John Babbis) The only English program we can depend on, except when frequently pre-empted for ballgames (gh) To see about getting more English into The Voice of Greece or make comments on *Greeks Everywhere* write to Apodimos. ERAS@ert.gr Apodimos means "absent from home" or "living abroad" (John Babbis, MD, DXLD) Good, but they still have a narrow focus on the diaspora, for whom English is somewhat necessary. How about the rest of the English-speaking world? (gh)

**INDONESIA** RRI Jakarta, 9680 heard again at 1000-1020, with the *Kang Guru Radio English* KGRE program (Wed & Sun), pop Asian songs, talking about Australia, Bali address to write and tell them in 75 words or less about yourself; WYFR is no longer on during this time slot (Ron Howard, CA, DXLD)

**INTERNATIONAL WATERS** [non?] on 6844-USB at 2310-2313\*, unknown language and English about Somalia; "the coalition forces are working

with criminals... the coalition forces will find you; it is only a matter of time" (Harold Frodge, MI, MARE Tipsheet) Must be Coalition Maritime Forces broadcast to Somali pirates. Reported earlier on 9223-USB (Jari Savolainen, HCDCX) 2302 on 6844 USB, alternating English/Somali (or Arabic) until 2310\* (Steve Lare, MI, DXLD)

**IRAN** V. of Justice, English to NAM 0130-0230 on 7235; announces internet URL and satellite sked; doesn't give SW info. Hams on 7238.5 LSB spar with them (Bob Thomas, CT, DXLD) Also on 9495 at 0130, March 29; man-woman team with news, weather in Istanbul (yes); for the whole world, "especially Americans" (Eric Bryan, WA, ibid.) 9495, things perceived to be wrong with America, separated by brief musical stingers (John Callarman, TX, ABDX)

Other VIRI English monitored: 1030-1130 on 15600 17660, 1530-1630 on 17370 9635, both suffering co-channel interference, and 1930-2030 on 6205 7205 and 9925 (Mike Barraclough, England, World DX Club Contact) 1930 also scheduled on 9800. Reserve channels: 1530 11650, 1930 11860 (Wolfgang Büschel, BCDX)

**JAPAN** [and non] R. Japan's *World Interactive* has replaced *Hello from Tokyo* at the same times as before, hosted by Ms. Kay Fujimoto and Mr. Ryan Drees who have been RJ newscasters. Includes *DX Corner* on 2<sup>nd</sup> and 4<sup>th</sup> weekend of the month during the 50-minute show. Some times useful in NAM: Sat 0510 6110-Canada; 1010 6120-Canada; 1710 15355-Gabon; Sun 0010 6145-Canada; 0310 21610; 1110 6120-Canada; Mon 0110 11935-Bonaire (Toshi Ohtake, DSWCI DX Window)

NHK Warido in Japanese reconfirmed with western classical music show UT Sat during most of the 2300 hour, one week featuring solo violin music by Bach, on 15265, via Bonaire at 170 degrees for SAM, but good here (gh)

**KOREA NORTH** [non] The *Shiokaze* broadcast by "Investigation Commission on Missing Japanese Probably Related to North Korea" expanded English to every Tuesday at 14-15, repeating the second half at 19-1930, on 5890 via Russia. They have received reception reports from Korea, China (7 cities), Laos, USA, Canada, Australia, New Zealand, UK, Portugal, Sweden, Finland, Holland, and Russia, but not yet directly from the kidnapped persons in North Korea (ABI via Takahito Akabayashi, Japan, DXLD)

**LAOS** [non] Hmong Lao Radio confirmed a UT hour earlier for summer on WHRI, Sun & Sat at 1300-1400 on 11785 (gh)

**LIBYA** [and non] For A-06, V. of Africa from the Great Jamahiriya came up with two solid hours of English at 14-16 on 17850 and 21695 via France; for parts of Africa but propagating back here on good days. One time it was on 17695 instead by mistake for a few minutes. As always, lots of readings from Qaddafi's *Green Book*, punctuated by music of Beethoven, talks about African geography, etc. (gh, OK) TDF schedule shows 21695 replaced by 17725 from 7 May to 3 Sept, 500 kW, 140 degrees, while 17850 is 153 degrees (Wolfgang Büschel, DXLD)

For A-06, Sawt al-Amel, V. of Hope, clandestine for Libya, continued its schedule of 12-14 UT on frequencies jumping anywhere from 17670 to 17695, give or take, trying to evade constant jamming from several different sources (including GABON, q.v.). Sometimes it tuned up on one frequency attracting jammers, then switched to another, and yet another half-way through.

Signals from the jammers carrying V. of Africa programming correlate well with RFI 17620 from Issoudun, France. The African music jammer often starts late, as it awaits instructions on which frequency to hit. Most of the music played by the music jammer after 1330 is of the Congo-Kinshasa type. It can often be sorted out by the Lingala words *bolingo* = love and *motema* = heart in the lyrics. Two different buzz jammers are audible irregularly, and may be lower power transmitters located within Libya.

The 17660 music channel transmitter is tuning up around 1145 with open carrier, then goes off and is back at 1154, when it has 1050 Hz pips until 1159:45. This indicates Krasnodar, Russia, or Grigoriopol, Moldova. The latter agrees best with the observed signal strength (Olle Alm, Sweden, DXLD) Something new happened April 5, with Saut al-Amel using two frequencies at once, 17670 and 17680, each later shifting to 17675 and 17685 (José Miguel Romero, Spain, DXLD)

**LITHUANIA** R. Vilnius announced English is now: 0030-0100 on 11690, 0830-0900 on 9710, 1800-1830 on 666, 2330-2400 on 9875 (Edwin Southwell, UK, World DX Club Contact)

**MONGOLIA** MRT A06 English: 10-1030 on 12085, 250 kW, 178 degrees; 15-1530 & 20-2030 on 12015, 50 kW, 315 degrees (via Alokesh Gupta, DXLD)

**NETHERLANDS** [non] Listeners in WNA who have missed the 00, 01 or 04 UT RN broadcasts still have two more chances to hear repeats of that day's programs, as the broadcasts to NZ and Au have been moved up to 06 and 07 on 9700 via Bonaire, too early to start the new day's programs (gh)

**NEW ZEALAND** [and non] The A-06 season began with a major collision between RNZI and WEWN Spanish on 9885, about 5 Hz apart. WEWN scheduled 0500-2200, 155 degrees to South America, RNZI 0655-1059, 35 degrees to Pacific, so RNZI's entire span on 9885 is conflicting with WEWN. Theoretically, there is no overlap of target areas, but it's a bad mix at least in NAM (gh) WEWN is spoiling my reception of RNZI. Surely we can do better than this! (Noel R. Green, NW England, DXLD)

**PAKISTAN** PBS started a new English service March 20 for Pakistanis in WEU, 0730-0830 on 15100, 17835 (AAP via Media Network blog) Extending and replacing part of the Urdu broadcast from 0805 (gh) Strong but totally incomprehensible. On what basis is it worthwhile for me to listen to this



dreadful racket? It also seems to be merely Government propaganda, not free media (Mike Barraclough, England, DXLD) I have contacted both the engineering department and the producers of the English programme. Hopefully they will be able to solve the problem; otherwise it seems a waste of time and money to broadcast something which listeners cannot understand (Christer Brunström, Sweden, *ibid.*)

**PAPUA NEW GUINEA** Disgruntled landowners from Longo and Kave, just outside Mendi town, forced R. Southern Highlands, the provincial station, NBC *Nek bilong Muruk*, to close on March 3 over a K1 million compensation demand for the land on which the transmitter is located. It was still off 3 weeks later (*The National*, PNG) 3275!

**PARAGUAY** Radio Nacional, 9737, has been inactive since about Nov 20, 2005, lacking on the dial its nice programs of Paraguayan music, news, sports. Reply from station to my inquiry said, thanks for listening to the Mother Country, and we'll let you know when we are back on the air (Manuel Méndez, Spain, DXLD) Still off in mid-April (Arnaldo Slaen, Argentina, *Noticias DX*)

**PERÚ** New SW station? Alfredo Cañote near Lima says he has been hearing R. Espacial, Otuzco, La Libertad on 4620 from 1900 to 2300 (Arnaldo Slaen, Argentina, *Noticias DX*) 4620.51, at 0956-1030 mentioning Perú; rooster sound effects, música linda (Bob Wilkner, FL, HCDX)

**POLAND** R. Polonia, A-06 English on SW: 1200-1259 9525 & 11850; 1700-1759 7220 & 7265 (Radio Polonia website, via Daniel Sampson, PTWS)

**ROMANIA** RRI A-06 English:

0630-0656	9655 11830 15440 17770
1300-1356	11830 15105
1800-1856	9635 11830
2130-2156	7210 9535 11940 15465
2300-2356	6140 7265 9645 11940
0100-0156	9690 11825
0400-0456	9780 11820 15110 17870

(DX Mix News, Bulgaria)

**RUSSIA** Radiostantsiya Tikhii Okean, Vladivostok, A-06: 0835-0900 on 9765; <http://www.ocean-dx.narod.ru> (Roman Nazarov, Primorskiy kray, open\_dx via Vladimir Emelyanov, Samara, RUS-DX) 9765 fair but cutting in and out, ex-5960, ex-0935-1000. More than a month's worth of mp3 files at <http://www.ptr-vlad.ru/radio/> The Russian music and folk songs are great! (Ron Howard, CA, DXLD)

**SÉNÉGAL** [non] West Africa Democracy Radio A-06: 07-11 on 17875 (Abdou. K. Lô, WADR via Manuel Méndez, Spain; Jean-Michel Aubier, France, DXLD) Now's the time around the solstice to try for this in NAm, when 16m may possibly be open all night from Europe (gh)

**SLOVAKIA** New website of RSI: <http://www.slovakradio.sk/inetportal/rsi/index.php>

There was an interview on the Spanish service with a member of the Slovak Radio council (José Miguel Romero, Spain, DXLD) Seems that the law requiring RSI to broadcast externally does not specify that this must be on SW. There is no way to confirm the number of SWs to RSI; letters from listeners are not a reliable indicator. But they think SW is more efficient than internet (gh) Since they sent out a schedule, it should be a few more months before next reports of a possible closure of their SW. English to NAm 01-0127 5930 9440; Au 07-0727 9440 15460; Eu 16-1627 & 1830-1857 5920 & 6055 (Ted Schuerzinger, Swprograms)

**SPAIN** [and non] Again this summer, REE reception for the only English hour to NAm, 0000, is problematic since they jumped way up from 6055 in the winter to 15385. In April sometimes it propagated, sometimes not, and when it did, collided with VOA in Chinese. It should work best around solstice, then start dropping off again (gh)

**SRI LANKA** SLBC Hindi service has been on 7301.5, but heard April 6 at 0130 on 7062 with very distorted audio; by 0200 on 7007 (Jose Jacob, India, DXLD)

**SUDAN** [non] Southern Sudan Interactive Radio Instruction in English, A-06: 0630-0700 M-F on 15535 via Armavir, Russia, 300 kW, 188 degrees (DX Mix News, Bulgaria)

**THAILAND** R. Thailand A-06 English, Udorn u.o.s., all 250 kW, with azimuths: 00-0030 9570 276; 0030-01 5890 Greenville 190; 03-0330 5890 Delano 180; 0530-06 17655 321; 1230-13 9835 132; 14-1430 9830 132; 19-20 7155 329; 2030-2045 9680 321 (Wolfgang Büschel, BCDX)

**TURKEY** If you can catch VOT running its haunting interval signal for several minutes before or after a scheduled broadcast, listen carefully. The repetitions are not identical; the pianist inserts some different flourishes as they go along (gh)

**TURKMENISTAN** Exact schedule for Turkmen Radio news in English is: Mon-Sat 1500-1510 on 5015, 1640-1650 on 4930. All confirmed during March (Rumen Pankov, Bulgaria, BDXC-UK Communication) And does not observe DST

**UGANDA** [non] Radio Rhino International Africa, closed? Was scheduled M-F 15-1530 in English via Jülich 17870 from Jan. 9. But website <http://www.radiorhino.org/> shows final date as Feb. 28 (Wolfgang Büschel, BCDX) They have come and gone several times, so perhaps will be back in a while (gh)

**UKRAINE** RUI A-06 English: 21-22 Eu 7490; 00-01 & 03-04 NAm 7440; 11-12 Eu 15675. In mid-Sept plans to change them all to 5830, 5810 and 9950 respectively (Alexander Yegorov, Kyiv, via Alokesh Gupta, DXLD)

7440/5810 are 500 kW, the rest 100 kW (DX Mix News, Bulgaria)

**U K** [non] WRN A-06 DRM via Bulgaria: 0800-1400 13865, 1400-1800 11540, 1800-2100 9310, with WRN English to Europe, including WORLD OF RADIO Sat 0800 (WRN via DXLD)

**U S A** WORLD OF RADIO on WWCR at 2030 on 15825 switched from Thu to Fri (gh)

New WRMI schedule as of April included DX programs: WORLD OF RADIO: UT Sat 0400 9955, Sat 1430 7385, UT Sun 0530 9955, UT Mon 0500 9955. MUNDO RADIAL: Sun 1030 9955. DX Partyline: UT Sat 0500 9955, UT Sun 0500 9955, Sun 1430 7385, UT Mon 0530 9955. AWR Wavescan: UT Sat 0530 9955, Sat 1500 7385, Sun 0630 9955, Sun 1500 7385.

Radio República via WRMI 9955: 08-10 Sat & Sun; 09-14 M-F; 16-21 daily; 02-05 Sun & Mon. See also CUBA [non]. We're installing a program called Simian which will allow us to automate all transmitter, antenna and programming operations, giving us a lot more flexibility, and have fixed an audio distortion problem, so modulation sounds better. Internet audio problems have also been corrected (Jeff White, WRMI, WORLD OF RADIO)

A-06 private SW schedules are on the FCC-IB Website: [http://www.fcc.gov/ib/sand/neg/hf\\_web/A06FCC01.TXT](http://www.fcc.gov/ib/sand/neg/hf_web/A06FCC01.TXT) (Thomas Moyer, Ont., DXLD) There could be later versions changing the last 1 to 2, etc.

A set of new call letters grabbed our attention as we scanned thru the listings, KTM. That's the new station in Oregon from Transformation Media International, supposedly to have a website <http://www.transformationmediainternational.com/> but nothing there yet. Appearing in this list does not mean they are on the air, or even close, but they may be on the air by October 29, 50 kW each, daily, with azimuths: 01-05 11570 70, 02-04 9845 130; 07-11 9820 309 degrees. Further research found a similar schedule already coordinated effective Feb 1, when they were certainly not on the air either, with an additional entry, 00-04 on 9465 110. Note that all but one of these happen to cross North America. FCC records show a construction permit was granted on Oct 3, 2005 (gh)

VOA African service via Greenville, and hence very well heard here in CNAm, is back on 15445 at 19-21, ex-15580, including *Music Time* in Africa on new schedule Sun & Sat 20-21, *Africa Beat* weekdays. Those too close to NC may have better luck from // 15410 Morocco (gh)

VOA's phone-in show *Talk To America* shifted from 1605 to 1405 M-F (Mike Cooper, GA, DXLD) Due to further transmission cuts, the 1400 hour was originally scheduled to be on only 3 SW frequencies, but more were quickly added: including 17730, 15580 and 13795 Botswana, 17720 São Tomé, 15490 Lampertheim; plus 17685, 15185 from somewhere (Wolfgang Büschel, BCDX) 17720 and 15490 audible here on good days, but most reliable on 9760 Philippines; new time more convenient for breakfast listening in WNA (gh) The hour to Africa at 21-22 including popular jazz and country music programs was dropped to free up funds for SW frequencies for rescheduled *Talk to America* (kimandrevelliott.com)

Now *Christian Media Network* is targeting Québec in French (sort of): *Prophétie Québec*, on WBCQ 9330-CLSB, Wed and Fri 13-14 (gh) *Lost Discs Radio Show* moved 24 hours later to UT Sun 02-03 on 7415 and 5110 (Larry Will, DXLD)

A-06 brought another US SWBC onto the 60 m band, WEWN in English on 5035 at 00-05, then 5050 at 05-14. We expected FEMA might bump them off 5035, too, but not yet as of mid-April (gh)

[non] *Voice of Joy Music Hour* for A-06 moved from 1400 to 1900 UT Saturdays on 6220 (Dean Phillips, V. of Joy, DXLD) Believed to be via Russia to Mideast (gh)

**URUGUAY** From monitoring I can assume that SODRE is currently not on the air on SW, 6125 or 9621 (Horacio A. Nigro, Uruguay, DXLD) No, not heard on any of its frequencies, nor is Emisora Ciudad de Montevideo (Arnaldo Slaen, Argentina, *condig list*) So at the moment SWBC does not exist in Uruguay (Nigro, *ibid.*)

**UZBEKISTAN** R. Tashkent, which had to close down SW at the end of 2005, also closed internet streaming at the end of March, in effect terminating the station. Word of the impending closure began to come by March 23 from members of the German language staff (via Kai Ludwig, Wolfgang Büschel) The web stream also became more erratic and at first it was thought the closure had already happened, but it continued to March 31 (gh) I heard their English transmission 1330 March 31 via the internet. No mention of any closedown during the broadcast. Webpage was still up April 4 but news stories not updated since March 18th and audio feeds not working (Mike Barraclough, World DX Club Contact) Nor did we hear anything directly or indirectly from the English service about the closure (gh)

You can still try for Uzbekistan in English via CVC International: 0100-0300 7355; 0300-0600 13685 (*MARE Tipsheet*) Not the same, and how sad that Uzbekistan now prefers to SW broadcast foreign evangelists instead of its own national voice (gh)

**ZIMBABWE** ZBC had been putting out a widely heard harmonic on 6612, 2 x 3306, but on at least one occasion, March 25-26, it jumped to 6688, also widely reported all over N & S America between 2240 and 0220. It could not be confirmed whether the fundamental had also jumped to 3344 (gh)

Until the Next, Best of DX and 73 de Glenn!

# BROADCAST LOGS

NOTEWORTHY LOGS FROM OUR READERS

Gayle Van Horn, W4GVH

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## 0001 UTC on 6819.4

PERU: La Voz de las Huaringas. Spanish. Criollo announcer's public service announcement and agricultural item (Fernando Garcia, Baltimore, MD). Station is not listed in PTWBR 06. Peruvians monitored: **Radio La Ponderosa** 6536, 0335; New Peruvian **Radio Espacial** 4920, 1900-2300 SINPO 44424 (Alfredo Cañote, La Molina, Lima, Peru via Arnaldo Slaen, Buenos Aires, Argentina). Tentative on **Radio Sinai** 6060.86, 1045-1100 (Dave Valko, PA/Cumbre DX). **Radio Santa Monica** 4965, 0928-1005 Spanish text and IDs: **Radio del Pacifico** 4974.8, 2339-2356 (G. Van Horn, NC).

## 0026 UTC on 6925.65

PIRATE: KSUR. "K-Sur" identification to rock "surf" music format. ID from Big Daddy Don including email [radioksur@yahoo.com](mailto:radioksur@yahoo.com). Signal gone at 0044. Solid S-7 signal though freq drifting down to 6925.45 by 0040 (Valko, PA). **Undercover Radio** 3480, 019-0112\* with mentions of Cdr. Bunny; **The Crystal Ship** 6854, 1429-1508 (Joe Wood, Greenback, TN).

## 0100 UTC on 6150

ROMANIA: Radio Romania Int'l. Evening program segments *Newsreel*, *Focus* and *Science Magazine*. SINPO 34543 (Kraig Krist KG4LAC, Manassas, VA). 7105, 2321-2326+. Station ID and *This is Romania* program (Frodge, MI).

## 0107 UTC on 3320

SOUTH AFRICA: Radio Sondergrense. Afrikaans news and segment on South Africa's deserts (Wood, TN). **Channel Africa** 17770, 1540 with talks on Uganda and Zambia (Wood, TN). **Radio Okapi** via Meyerton 11890, 1603-1610 (Slaen, ARG). Station is a joint project involving the Swiss-based *Foundation Hirondelle* and the UN. - GVH

## 0130 UTC on 6120

IRAN: VOIRI. Station ID as "Voice of Justice" with frequency quote. Prayers, today's date and twelve minutes of news, followed by weather forecast. *The American True Story* program to headlines repeat at 0226 to 0229\* (Garcia, MD).

## 0315 UTC on 9665

BRAZIL: China Radio Int'l relay via Brasilia. Spanish. News on inauguration in Nairobi, Kenya, of an FM station. Item on Taiwan to station identification at 0334 into *Ventana Abierta* (Garcia, MD). Brazilians in Portuguese: **Radio Congonhas** 4775, 2158; **Radio Guarujá Paulista** 5940.29, 0300-0306 (Slaen, ARG). **Radio Educação Rural** 4925, 1022+; **Radio Nacional** (Macapa) 4915, 0222 (Wood, TN).

## 0332 UTC on 7205

CLANDESTINE: Voice of Islamic Palestinian Revolution (via IRIB). Arabic news bulletin // 9505. SINPO 22432. Clandestine **Radio Free Southern Cameroon** 11840, 1800-1807 with IDs and English programming (Slaen, ARG). Station is relayed via *Armavir, Russia*. Reception reports to: [radiofreesoutherncameroon@yahoo.com](mailto:radiofreesoutherncameroon@yahoo.com) - GVH. **Voice of Biafra** 7380, \*2100 with program focus on Nigeria (Garcia, MD).

## 0415 UTC on 5880

UKRAINE: Radio Ukraine Int'l. *Ukraine Diary* featuring reviews of today and last week in Ukraine into music. Freqs and schedule to 0459\* (Garcia, MD). 5880, \*0100 with IDs and national news to 0158\* (Garcia, MD).

## 0530 UTC on 9430

AUSTRALIA: CVC Int'l. News and sports into pop/rock. Station ID as "Global Radio...music for your life." Programming off abruptly at 0559 (Garcia, MD). CVC via Germany 15680 at 1600 with news and ID (Greg Harris WDX9KHY, Park Forest, IL).

## 1205 UTC on 6070

CANADA: CFCX. News and weather and ID as "Newsradio Ten Ten." Fair signal quality (Bob Fraser, Belfast, ME). CBC 6100 at 2300 (Mark Morgan N8QIK, Cincinnati, OH). **CFRX** 6070, 2101-2120 (Frodge, MI). **China Radio Int'l** Canadian relay 6020 at 0030 // 9570 (Fraser, ME).

## 1225 UTC on 7505

USA: KTBN. Closing minutes of *Into the Hearts of Men* into com-

mercial for church security. *Bishop Circle Partner* followed by the *Paula White Today* program (Krist, VA). **WWCR** 9985, 1750-1802+; 15825, 2143-2159; **WYFR** 17555, 2128-2135+ (Frodge, MI). **WRMI**-Radio Miami Int'l. 7385, 2258+; 7385, 2350-0005 (Frodge, MI). **WWCR** 12160, 1509. (Wood, TN).

## 1230 UTC on 15700

BULGARIA: Radio Bulgaria. Newscast followed by Folk Studio program. SINPO 35333. (Krist, VA) 11700, 0205 identification on Bulgaria (Wood, TN).

## 1350 UTC on 9580

AUSTRALIA: Radio Australia. Segment on nature's signs of weather changes; 6020 // 9580 at 1200 (Fraser, ME). Segment on Aussie consumerism into news briefs 11660, 2125 (Howard Moser, Lincolnshire, IL).

## 1354 UTC on 15105

CLANDESTINE: Hmong Lao Radio. Tentative logging for male's reading in vernacular language. Additional clandestines logged: **Denge Mesopotamia** 11530, 1445+; **Radio Payam E-Dost** 7480, 1842 in Farsi; **Save the Gambia Democracy** 9405, 2001+ (Slaen, DX Camp, Chascomus, Argentina).

## 1400 UTC on 21600

SAUDI ARABIA: BSKSA. Sign-on interval signal to time pips into French service identification. Call to prayers with French translations into four minutes of news. Comments about the Middle East to 1423\* (Garcia, MD).

## 1400 UTC on 15155

TURKEY: Voice of Turkey. *Cultural Cohabitation* with topics on freedom, responsibilities and indulgence. Station ID followed by *Did You Know* This segment on Prince Islands (Krist, VA). 9785, 1854-1902+ (Frodge, MI).

## 1412 UTC on 13865

ICELAND: Ríkisúvarpid. Icelandic announcements to music. Audible at 1855 recheck with chat about football (Slaen, ARG). 12115, 2316 with talks and mentions of Reykjavik. Faint RTTY interference (Wood, TN).

## 1425 UTC on 15140

OMAN: Radio Sultanate of Oman. Music program featuring tunes from Toto (Rosanna), Lionel Richie (Say You, Say Me) and Eagles (Take it To The Limit). SINPO 25322 (Krist, VA).

## 1524 UTC on 15505

KUWAIT: Radio. Arabic recitations to Middle Eastern music, with fair signal quality. (Garcia, MD) 11990, \*1515 with sign-on routine and IDs (Garcia, MD). **VOA via Kuwait** 7595 at 2035 *Making of a Nation* program to 2100\* (Wood, TN).

## 2018 UTC on 12025

RWANDA: Deutsche Welle relay. News on the Middle East, and items on AIDS drug advancements in Nigeria. German ID and news on 11690, 2113 and 2200 (Moser, IL).

## 2255 UTC on 6290

PIRATE (EURO): Laser Hot Hits. Excessive interference from 6280 kHz, but was // 6219. Mentions of Radio North Sea and Radio Caroline at 2258. Web site quote with series of Jim Croce hits including *Time in a Bottle* // 4025.34. Signal fade by 0055. Additional Euro's logged: **Mystery Radio** 6220, 2320 with dance music. Station ID 12 2328 and big signal peak by 0049. **Radio Mazda** 6290.05, 0802 and 2215; **Orion Radio** 6400.56, 0705; **Radio Malaysia** 6309.02, 0713; **Radio Scotland Int'l** 6300.28, 0724 (Valko, PA).

## 2232 UTC on 7110

ALBANIA: Radio Tirana. News from Albania program and *Calendar* program. **China Radio Int'l** Albania relay 7210, 2252-2301+ (Frodge, MI). R. Tirana 7530 at 1955 (Fraser, ME). 7455, \*0245 IDs, freq schedules. Government corruption news into vocals // 6115 to 0259\* (Garcia, MD).

Thanks to our contributors – Have you sent in YOUR logs?  
Send to Gayle Van Horn, c/o Monitoring Times  
English broadcast unless otherwise noted.



## RNZI: The Voice of the Pacific

**A**s with its counterpart in the South Pacific, Radio Australia, Radio New Zealand International also has emerged stronger after hard times.

Back in 1998, RNZI was forced to cut its production hours and initially all of its Pacific islands language programs as the result of a 13% budget cut engineered by the government at the time. After a threatened complete shutdown, this result seemed to be almost a victory despite the loss of five full time positions, a halving of the station's morning productions and elimination of all of its evening programming. Pacific island governments, whose nations rely greatly on RNZI as a source of news, inter-island communication and cultural enrichment, protested mightily to New Zealand's Foreign Affairs Ministry which resulted only in a token restoration of regional language newscasts. Things did not look good at all.

But fast forward seven years to 2004, and the story becomes much, much different. Beginning in that year, a more forward looking government engineered a substantial increase in funding to enable RNZI to increase its daily broadcasts of original programming and, in particular, its coverage of Pacific current affairs. One year later came another substantial budget increase for operating costs, as well as a new digital shortwave transmitter. The Labour government's Minister for Broadcasting, Steve Maharey, taking note that "the station, with just eleven fulltime positions, consistently punches above its weight in providing a service that is well known and respected throughout the Pacific region," stated that "the service is to receive funding which will secure its future operations."

"Shortwave broadcasting remains the best possible way of reaching a large area with a reliable signal, at a low cost," stated Maharey. "The new transmitter will provide a vastly improved, high quality signal to the fourteen Pacific radio stations that rebroadcast RNZI news and programmes every day." Parliament made an international radio service to the South Pacific part of the charter obligation of the nation's public broadcaster, Radio New Zealand, and supported it in the budget.

The plan is for RNZI to broadcast in both analog and digital formats for now, gradually transitioning to an all-digital service at an appropriate time in the future. Given the fact that most listeners to RNZI in the Pacific island nations will not likely be able to afford the new, more expensive digital radios, it would appear that the digital service would be used initially as primarily a "feeder" operation for a growing network of local FM stations on the various islands.

### ❖ The Service

RNZI broadcasts to the Pacific 24 hours a day. It is heard – on shortwave, via local FM, and on the internet – from Papua New Guinea in the west across to French Polynesia in the east, covering all South Pacific countries in between.

Surveys show that it is one of the most listened to, if not *the* most listened to, station(s) in the Pacific – and one of the most valued and trusted. It provides bulletins of Pacific, world, New Zealand, business and sports news, along with Pacific language news bulletins.

During the Pacific cyclone season, Radio New Zealand International provides a valuable and life-saving Cyclone Weather Service. When Cyclone Alerts are issued for South Pacific countries, it broadcasts hourly updates of weather conditions – 24 hours a day if necessary.

Programming consists of RNZI's own productions combined with relays of National Radio, one of the country's two national radio networks.

### ❖ Listening In

Of course, given the nature of shortwave and the internet, RNZI can be heard worldwide. For us, it means a ready and unique source for news about the South Pacific region, especially the small island nations of the Pacific Ocean which receive virtually no attention from our own domestic media.

With the coming summer months in North America, opportunities to hear RNZI via shortwave become enhanced. Signal propagation from the South Pacific improves, even taking into account the solar minimum we are currently experiencing. When shortwave conditions won't cooperate, the internet provides a reliable alternative. This is all to the good for us, allowing for a full immersion into New Zealand's national public media, as well as a view of the world – theirs and ours – as seen and heard by Pacific islanders.

The accompanying sidebar offers a full, comprehensive schedule of the programming broadcast by RNZI. Updates and other pertinent information may be found at [www.rnzi.com](http://www.rnzi.com). That web address also offers a link to the full time live audio feeds, as well as about half a dozen RNZI-produced programs available on demand and a daily podcast.

Furthermore, Radio New Zealand offers a very attractive web site of its own [www.radionz.co.nz](http://www.radionz.co.nz) with full time live feeds of its two domestic networks, National Radio and Concert FM, continually updated news in text format, and other special information and links

### COMPREHENSIVE RNZI SCHEDULE

#### SUNDAY

**RNZ National News on the hour, except RNZI World and Pacific News at 1800, 1900, 2000, 2100, 2200**

#### 0015

**Spectrum** - People, places and events in New Zealand

#### 0040

**The Arts on Sunday with Lynn Freeman** - Information and analysis from the world of books, arts and movies, including:

**0106 At the Movies**

**0304 The Sunday Drama** - The best of New Zealand's writing, acting and directing talent

#### 0406

**4 'til 8 with Katrina Batten** - A selection of special interest programs, including:

**0406 The Sunday Feature** - documentaries

**0512 Spiritual Outlook** - Spiritual discussion and debate with Maureen Garing

**0536 Waiata** - Maori Music

**0606 New Zealand History** feature

**0704 One in Five** - The issues and experience of disability

#### 0806

**Sounds Historical with Jim Sullivan** - Nostalgic news, features and interviews

#### 1012

**New Music Releases** - A sample of the latest Kiwi music hosted by Hana Tateré

#### 1108

**Wayne's Music** - Wayne Mowat presents a selection of tunes too good to be forgotten

#### 1204

**All Night Programme** -

Including: **1206** Music from Midnight; **1230** Discovery (BBC); **1306** Tagata o te Moana (weekly Pacific magazine program features New Zealand and regional Pacific news, issues, information and music presented by Koro Vaka'uta); **1515** Book reading; **1530** Diversions

#### 1605

**New Music Releases**

#### 1708

**Tagata o te Moana** - Pacific news, interviews, and music

#### 1800

**Morning Report** -

Radio New Zealand's and RNZI's 3-hour-hour breakfast news show with news and interviews, bulletins on the hour and half-hour, including: **1810 & 1910** Sports News; **1815** Pacific News; **1819** Rural News; **1827 & 2045** Waatea News; **1830** NZ News Headlines; **1835 & 1955** Pacific Business Report; **1840** News in Tongan; **1846 & 1934** Traffic; **1847** Business News; **1844 & 1941** NZ Newspapers; **1855** Pacific Weather; **1859** Pacific Money Update; **1915** Tagata Highlights; **1935 & 2035** News about New Zealand; **1940** Pacific Press Review (in French); **1942 & 2034** Sports News; **1950** NZ Newspaper Headlines; **2015** Focus on Politics; **2022** Overseas Newspapers; **2040** RNZI Feature

*Sounds of NZ - birdcalls*

#### 2110

**Sports News**

#### 2115

**Tagata Highlights**

#### 2135

**Nine to Noon** (joined in progress)

Current affairs and topics of interest, including: **2245**

Book reading

## MONDAY-FRIDAY

**RNZ National News on the hour except RNZI Pacific Regional News at 0100, 0300, 0800, 1100, 1300, 1500, 1700 and RNZI World and Pacific News at 2000, 2200 [Mon.-Thu.]**

**0000**

**Midday Report** - Radio New Zealand news, followed by updates and reports until 0100, including: **0016** Business News; **0026** Sport; **0034** Rural News; **0043** Worldwatch

**0106**

**Afternoons with Jim Mora** - Information and debate, people and places around New Zealand

**0308**

**Dateline Pacific** - A daily round-up of the very latest news from the Pacific with interviews and features with all the region's news makers drawing on the work of staff and 20 Pacific journalists from around the region

**0330**

**(M) New Music Releases**

**(T) Mailbox** - This program is aimed at the dedicated shortwave listener. Myra Oh reads letters and news of interest, we have reports on the latest DX news, and Frequency Manager Adrian Sainsbury answers and explains technical questions. You can also hear the latest solar propagation news supplied by IPS Radio & Space Services.

Alternates with **RNZI Talk** - A fortnightly introduction to the people behind the voices. RNZI staff, along with others from National Radio, talk about their work and background. RNZI Talk will also keep you up to date with RNZI developments, projects and programs.

**(W) Tradewinds** - News editor **Walter Zweifel** compiles this weekly program featuring Pacific regional business and economic news and features.

**(H) World in Sport** - Highlights of the world's sporting week with emphasis on New Zealand and the Pacific. There are interviews, reviews and reaction, plus previews of upcoming games.

**(F) Pacific Correspondent** - Regional correspondents talk to Ben Lowings about political and social issues in their respective Pacific countries.

**0500 Checkpoint**

**Radio New Zealand's** 2-hour news and current affairs program, including: **0515** Business Headlines; **0530** News and Sport; **0545** & **6:45** Waatea News

**0706 Nights with Bryan Crump** -

Entertainment and information, including at **0904:**

**(M) Insight** - A weekly in-depth current affairs program of national and international interest)

**(T) Tuesday Feature**

**(W) Wednesday Drama**

**(H) Our Changing World** with Veronika Meduna and Dean Williams - Science, environment and health stories

**(F) Country Life** - A weekly program of issues and stories of particular concern to the rural community, and also of interest to a general audience.

Preempted on **RNZI** for one hour as follows:

**0808**

**Dateline Pacific** - A daily round-up of the very latest news from the Pacific with interviews and features with all the region's news makers drawing on the work of staff and 20 Pacific journalists from around the region.

**0830**

**(M) Mailbox** alternates with **RNZI Talk**

**(T) Tradewinds**

**(W) World in Sport**

**(H) Pacific Correspondent**

**(F) Linda Clark** - Current affairs and interviews

**1000**

**News and Late Edition** - Radio New Zealand national and international news, including the day's best interviews from National Radio

**1108**

**Dateline Pacific**

**1130**

**(M) Mailbox** alternates with **RNZI Talk**

**(T) Tradewinds**

**(W) World in Sport**

**(H) Pacific Correspondent**

**(F) Linda Clark**

**1200**

**News and Late Edition** (repeat of 1000 program)

**1308**

**Dateline Pacific**

**1330**

**(M) Mailbox** alternates with **RNZI Talk**

**(T) Tradewinds**

**(W) World in Sport**

**(H) Pacific Correspondent**

**(F) Linda Clark**

**1406**

**All Night Programme** (joined in progress) Including:

**(M) 1405** In a Mellow Tone (*RNZ*); **1515** Book reading; **1530** What's the Word? **1605** Book Reading; **1630** Global Business (*BBC*)

**(T) 1515** Book reading; **1530** Books; **1605**

Book reading; **1636** Musical Chairs

**(W) 1515** Book reading; **1530** The Word (*BBC*);

**1605** Book reading; **1620** Playing Favourites

(*BBC*)

**(H) 1515** Book reading; **1530** Steemson's Auckland;

**1605** Book reading; **1630** The Sampler

**(F) 1515** Book reading; **3:30** The Week that Was;

**1630** Waiaata - Maori Music

**1708**

**Dateline Pacific**

**1730**

**(M) Pacific Press Review** (in French)

**(T) Tradewinds**

**(W) World in Sport**

**(H) Pacific Correspondent**

**(F) Linda Clark**

**1800**

**Morning Report** - Radio New Zealand's and RNZI's 3-hour breakfast news show with news and interviews, bulletins on the hour and half-hour, including:

**1810, 1910 & 2010** Sports News; **1815** &

**2015** Dateline Pacific; **1835** & **2035** News about

New Zealand; **1844** New Zealand Newspapers;

**1846** & **1934** Traffic; **1847** Business News; **1850**

& **1955** Pacific Weather Forecast; **1855** News in

Niuean; **1930** NZ News Headlines; **1935** & **2055**

Pacific Business Report; **1940** News in Tongan;

**1959** Pacific Money Update ; **2022** Overseas

Newspapers; **2034** Sports News

**2040**

**(M)** News in Solomon Island Pijin

**(T-H)** RNZI Feature

**(F) Saturday Morning with Kim Hill**

**(A)** Saturday morning mixture of current affairs and feature interviews

**2050**

**(M-H)** NZ Newspaper Headlines

*Sounds of NZ:* bird calls

**2110**

**(M-H) Sports Report**

**2115**

**(M) News in Solomon Island Pijin**

**(T) Tradewinds**

**(W) World in Sport**

**(H) Pacific Correspondent**

**2140**

**(M-H) RNZI Feature**

**2210**

**(M-H) Sports Report**

**2215**

**(M-H) Dateline Pacific**

**2235**

**(M-H) Nine to Noon** (joined in progress) - Current affairs and topics of interest, including: **2245** Book reading

## SATURDAY

**0010**

**This Way Up: A Manual for a Modern World with Simon Morton** - Simon Morton explores the things we use and consume

**0204**

**Music 101 with Sarah McMullan** - Sarah McMullan presents the best songs, music-related stories, interviews, live music, industry news and music documentaries from New Zealand and the world, including:

**0330 Musical Chairs** - National Radio's weekly New Zealand music profile

**0510**

**Focus on Politics** - Analysis of significant political issues presented by Radio New Zealand's parliamentary reporting team

**0530**

**Tagata o te Moana** - Pacific news, interviews and music

**0606**

**Great Encounters** - In-depth interviews selected from National Radio's feature programmes during the week

**0704**

**Saturday Night with Peter Fry** - Four hours of music, reminiscences, requests and entertainment, including: **0806 The Saturday Whimsy** - Alison Lloyd Davies introduces a recorded curiosity

**1106**

**Wayne's Music** - Wayne Mowat presents a selection of tunes too good to be forgotten

**1204**

**All Night Programme** Including: **1206** Going Solo; **1315** Euroquest; **1405** Spiritual Outlook; **1430** Hymns; **1459** Earthshock 7.9; **1515** Book Reading; **1530** Through Younger Eyes; **1630** Masterpiece (*BBC*); **1740** Little Mysteries

**1808**

**Storytime** - New Zealand stories for children

**1906**

**Hymns for Sunday Morning**

**1935**

**Weekend Worldwatch** - International news and news reports

**2010**

**Sunday Morning with Chris Laidlaw** - Discussion, features and music until midday, including:

**2012** Sportsworld; **2110** Mediawatch; **2206** The Sunday Group; **2230** Hidden Treasures with Trevor Reekie; **2305** Ideas

Until June and our semi-annual round-up of where and how to hear the BBC World Service, good listening!

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# THE QSL REPORT

VERIFICATIONS RECEIVED BY OUR READERS

Gayle Van Horn, W4GVH

gaylevanhorn@monitoringtimes.com

## Summertime Tentative Reporting

For those of us living in the northern hemisphere, it's summertime ... and that means only one thing! Radio conditions, especially on the lower bands, are riddled with excessive noise and static. Don't let poor conditions discourage you from bandscanning!

Perhaps the station did not identify itself, or you heard a partial ID amid a static crash. Everything else points to the sought-after station, including programming style, frequency and language correctly. This is a perfect opportunity to compose a Tentative Report—one that should, however, be used with caution. Use this report style only when there is little hope of obtaining further reception within a reasonable length of time. By reporting the programming details, you must make it clear to the station that, while you are not positively certain, based

on monitoring you believe it to be the station in question.

Tentative Reports should not be used if there is a good chance of hearing the station again, where programming may include an identification. If possible, try monitoring the station over several sessions to include as many programming details, date, frequency, parallel frequencies, language, and signal conditions.

Occasionally, you have no choice but to report the logging as "tentative"; however, don't rely exclusively on the station to confirm what "you think" you heard. This tentative method has been used successfully, but don't overuse it. While we're in the midst of summer static, it's one possible alternative to verifications.

### BOTSWANA

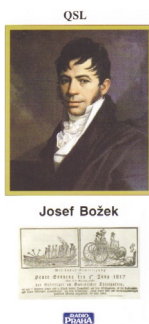
Voice of America relay, 13710 kHz. Confirmation letter signed by Thomas R. Powell-Transmitter Plant Supervisor, plus VOA program guide. Received in 55 days for an English report, applause card and one US dollar. Station address: IBB/International Broadcasting Bureau, Botswana Transmitting Station, Private Bag 0038, Selibe-Phikwe, Botswana. (Joe Wood, Greenback, TN)

### CLANDESTINE

Radio Free Southern Cameroons (via Armavir, Russia) 11840 kHz. Email confirmation via National News Group stating "RSFC received clearly in Canada," plus attachment of my original report with mention of reports received from Australia, Sweden, Austria, etc. Email report to: [radiofreesoutherncameroons@yahoo.com](mailto:radiofreesoutherncameroons@yahoo.com) (Edward Kusalik VE6EFK, Coaldale, Alberta, Canada). Station is produced by Freedomland Foundation Inc., and is a member of Coalition of Southern Cameroon Liberation Movement - GVH

### CZECH REPUBLIC

Radio Prague, 6200 kHz. Full data card featuring Josef Bozek, part of Czech Scientist and Inventors series, plus station magnet and program/frequency schedule. Received in six days for an email report to: [english@radio.cz](mailto:english@radio.cz) Station address: Vinohradská 12, 12099 Prague 2, Czech Republic. (Craig Krist KG4LAC, Manassas, VA) Website: [www.radio.cz](http://www.radio.cz)



Josef Bozek

### GERMANY

Overcomer Ministries, 9855 kHz. Email confirmation from Walter Brodowsky-DTK Jülich. Received in ten days for an email report to: [walter.brodowsky@t-systems.com](mailto:walter.brodowsky@t-systems.com) Email reports to Mr. Brodowsky are preferred, however correspondence may be sent to: Shortwave Radio Station Jülich - T Systems International, Rundfunksendestelle Jülich Merscher Höhe D-52428 Jülich, Germany. (Duane Hadley, Bristol, TN)

### MEDIUM WAVE

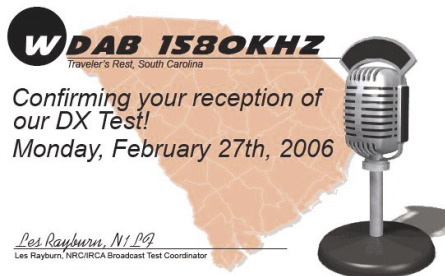
CHWO (All Time Favorites) 740 kHz AM. Two verification cards signed by Brian Smith-QSL

Manager, plus lots of station promotional goodies. Received in 30 days for two reports. QSL address: Ontario DX Association, 155 Main Street North-Apt. 313, Newmarket, Ont. Canada L3Y 8C2. (Patrick Martin, Seaside, OR) Website: [www.am740.ca/](http://www.am740.ca/)

KCMD (All Comedy Radio) 970 kHz AM. Full data prepared QSL card returned, signed by Dan Bozyk. Received in 90 days for an AM report. Station address: 222 SW Columbia Street # 350, Portland, OR 97201. (Martin, OR) Website: [www.johnson970.com/](http://www.johnson970.com/)

KGTK, 920 kHz AM. Verification form letter returned with illegible signature. Received in five days for two follow up AM reports. Station address: 1700 SE Mile High Dr. #201 A, Port Orchard, WA 98166. (Martin, OR) Website: [www.kgtk.com/](http://www.kgtk.com/)

WDAB, 1580 kHz AM. Bicolor WDAB confirmation card signed by Les Rayburn, NRC/IRCA Broadcast Test Coordinator. Received in nine days for an email report of special DX Test to: [les@highnoonfilm.com](mailto:les@highnoonfilm.com) (Dan Mallory, Everett, MA; Patrick Griffith, Westminster, CO)



Les Rayburn, N1PQ  
Les Rayburn, NRC/IRCA Broadcast Test Coordinator

WKSH (Radio Disney) 1640 kHz AM. Date/frequency verification letter signed by Deb Bratell-Station Manager, plus two stickers. Received in 48 days for an AM report taken in a parking lot on the truck radio. Station address: W223 N3251 Shady Lane, Pewaukee, WI 53072 USA. (Mike Hardester, Jacksonville, NC)

### MONACO

Trans World Radio, 9800 kHz (via France) Full data Village & Spring Flowers card (with site notation) signed by Beth Clark. Received for an English report. Station address: Boite Postal 349, MC-98007 Monte Carlo Monaco-Cedex

Monaco (Kusalik, CAN) TWR's U.K. address has been revised to: Trans World Radio, P.O. Box 606, Altrincham WA14 2YS United Kingdom. - GVH

### PIRATE

(Euro) Radio Blue House, 6304.99 kHz. Nice card and letter confirming broadcast is relayed by a Dutch pirate using somewhere between 500-1000 watts! Received in one month. Pirate mail drop: SRS Deutschland, Postfach 101145, 99801 Eisenach, Germany (Dave Valko, PA/Cumbre DX)

(USA) Mac Shortwave, 6950 kHz. Partial data card. Received in 83 days for a pirate report to: [macshortwave@yahoo.com](mailto:macshortwave@yahoo.com) (Wood, TN)

### ROMANIA

Radio Romania Int'l, 9755 kHz. Full data, unsigned card The Piatra Craiului National Park. Received in 79 days for an email report to: [english@rri.ro](mailto:english@rri.ro). Station address: 60-62 Berthelot St, RO-70747 Bucharest, Romania (or) P.O. Box 111, RO-70756 Bucharest, Romania. (Krist, VA) Website: [www.rri.ro](http://www.rri.ro)

### RUSSIA

Trans World Radio, 7535 kHz (via Irkutsk, Russia). Full data Chapel & Alps card (with site notation) signed by Beth Clark. Received for an English report. QSL address: Trans World Radio, Postfach 141, A-1235 Vienna, Austria. (Kusalik, CAN)

### SÃO TOMÉ

Voice of America relay, 7290 kHz. Partial data card. Received in six months for an English report and one US dollar (returned). Station address: VOA/IBB, Attention: Reception Reports, São Tomé Relay Station, P.O. Box 522, São Tomé e Príncipe. Return address on QSL: Voice of America, 4409 Cohen Bldg., Washington, DC 20237 USA. (Wood, TN)

### UNITED STATES

KTBN, 7505 kHz. Full data curtain array antenna card unsigned, plus Praise the Lord publication, and freq schedule. Received in 27 days for email report to: [comments@tbn.org](mailto:comments@tbn.org) (Krist, VA) Correspondence may also be sent to: Trinity Broadcasting Network, Attention: Superpower KTBN Radio, QSL Manager, 2442 Michelle Dr., Tustin, CA 92780 USA. Website: [www.tbn.org](http://www.tbn.org)



## HOW TO USE THE SHORTWAVE GUIDE

0000-0100 twhfa    USA, Voice of America    5995am    6130ca    7405am    9455af  
 ① ② ⑤    ③ ④    ⑥ ⑦

### Convert your time to UTC.

Broadcast time on ① and time off ② are expressed in Coordinated Universal Time (UTC) – the time at the 0 meridian near Greenwich, England. To translate your local time into UTC, first convert your local time to 24-hour format, then add (during Daylight Savings Time) 4, 5, 6 or 7 hours for Eastern, Central, Mountain or Pacific Times, respectively. Eastern, Central, and Pacific Times are already converted to UTC for you at the top of each hour.

Note that all dates, as well as times, are in UTC; for example, a show which might air at 0030 UTC Sunday will be heard on Saturday evening in America (in other words, 8:30 pm Eastern, 7:30 pm Central, etc.).

### Find the station you want to hear.

Look at the page which corresponds to the time you will be listening. On the top half of the page English broadcasts are listed by UTC time on ①, then alphabetically by country ③, followed by the station name ④. (If the station name is the same as the country, we don't repeat it, e.g., "Vanuatu, Radio" [Vanuatu].)

If a broadcast is not daily, the days of broadcast ⑤ will appear in the column following the time of broadcast, using the following codes:

Day Codes	
s/S	Sunday
m/M	Monday
t/T	Tuesday
w/W	Wednesday
h/H	Thursday
f/F	Friday
a/A	Saturday
D	Daily
mon/MON	monthly
occ:	occasional
DRM:	Digital Radio Mondiale

In the same column ⑤, irregular broadcasts are indicated "tent" and programming which includes languages besides English are coded "v" (various languages).

### Choose the most promising frequencies for the time, location and conditions.

The frequencies ⑥ follow to the right of the station listing; all frequencies are listed in kilohertz (kHz). Not all listed stations will be heard from your location and virtually none of them will be heard all the time on all frequencies.

Shortwave broadcast stations change some of their frequencies at least twice a year, in April and October, to adapt to seasonal conditions.

But they can also change in response to short-term conditions, interference, equipment problems, etc. Our frequency manager coordinates published station schedules with confirmations and reports from her monitoring team and MT readers to make the Shortwave Guide up-to-date as of one week before print deadline.

To help you find the most promising signal for your location, immediately following each frequency we've included information on the target area ⑦ of the broadcast. Signals beamed toward your area will generally be easier to hear than those beamed elsewhere, even though the latter will often still be audible.

Target Areas	
af:	Africa
al:	alternate frequency (occasional use only)
am:	The Americas
as:	Asia
au:	Australia
ca:	Central America
do:	domestic broadcast
eu:	Europe
irr:	irregular (Costa Rica RFPI)
me:	Middle East
na:	North America
oc:	Oceania
pa:	Pacific
sa:	South America
va:	various

### MT MONITORING TEAM

Gayle Van Horn  
Frequency Manager

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Daniel Sampson

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### Thank You ...

#### Additional Contributors to This Month's Shortwave Guide:

ADDX; Rich D'Angelo, Alokesh Gupta, New Delhi, India; *DX Mix News*; *NASWA Flash Sheet*; *BCL News*; *Cumbre DX*; Adrian Sainsbury, RNZ Intl; Daniel Sampson/*Prime Time-SW*; Anker Petersen, *DX Window*; *Observer*, Bulgaria; *BCL News*; *ODXA/DX Ontario*; Larry Van Horn N5FPW, MT Asst. Editor; *Hard Core DX*; *NASWA Journal*; WWDX.

### Shortwave Broadcast Bands

kHz	Meters
2300-2495	120 meters (Note 1)
3200-3400	90 meters (Note 1)
3900-3950	75 meters (Regional band, used for broadcasting in Asia only)
3950-4000	75 meters (Regional band, used for broadcasting in Asia and Europe)
4750-4995	60 meters (Note 1)
5005-5060	60 meters (Note 1)
5730-5900	49 meter NIB (Note 2)
5900-5950	49 meter WARC-92 band (Note 3)
5950-6200	49 meters
6200-6295	49 meter NIB (Note 2)
6890-6990	41 meter NIB (Note 2)
7100-7300	41 meters (Regional band, not allocated for broadcasting in the western hemisphere) (Note 4)
7300-7350	41 meter WARC-92 band (Note 3)
7350-7600	41 meter NIB (Note 2)
9250-9400	31 meter NIB (Note 2)
9400-9500	31 meter WARC-92 band (Note 3)
9500-9900	31 meters
11500-11600	25 meter NIB (Note 2)
11600-11650	25 meter WARC-92 band (Note 3)
11650-12050	25 meters
12050-12100	25 meter WARC-92 band (Note 3)
12100-12600	25 meter NIB (Note 2)
13570-13600	22 meter WARC-92 band (Note 3)
13600-13800	22 meters
13800-13870	22 meter WARC-92 band (Note 3)
15030-15100	19 meter NIB (Note 2)
15100-15600	19 meters
15600-15800	19 meter WARC-92 band (Note 3)
17480-17550	17 meter WARC-92 band (Note 3)
17550-17900	17 meters
18900-19020	15 meter WARC-92 band (Note 3)
21450-21850	13 meters
25670-26100	11 meters

### Notes

- Note 1 Tropical bands, 120/90/60 meters are for broadcast use only in designated tropical areas of the world.
- Note 2 Broadcasters can use this frequency range on a (NIB) non-interference basis only.
- Note 3 WARC-92 bands are allocated officially for use by HF broadcasting stations in 2007. They are only authorized on a non-interference basis until that date.
- Note 4 WRC-03 update. After March 29, 2009, the spectrum from 7100-7200 kHz will no longer be available for broadcast purposes and will be turned over to amateur radio operations worldwide

**GLENN HAUSER'S  
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# 0000 UTC - 8PM EDT / 7PM CDT / 5PM PDT

0000	0015	vl	Cambodia, National Radio	11940as	
0000	0015		Japan, Radio Japan/NHK World	13680as	
			17810as		
0000	0030		Burma, Dem Voice of Burma	5955eu	
0000	0030		Egypt, Radio Cairo	11885na	
0000	0030		Thailand, Radio	9570af	
0000	0030		UK, BBC World Service	3915as	5970as
			9740as	9790as	11945as
			17615as		15360as
0000	0030		USA, Voice of America	7555as	
0000	0045		India, All India Radio	9705as	9950as
			11620as	11645as	13605as
0000	0045		USA, WYFR Okeechobee FL	17805am	
0000	0057		Canada, Radio Canada Intl	11700as	
0000	0059		Spain, Radio Exterior Espana	15385am	
0000	0100		Anguilla, Caribbean Beacon	6090am	
0000	0100		Australia, ABC NT Alice Springs	2310irr	
			4835do		
0000	0100		Australia, ABC NT Katherine	5025do	
0000	0100		Australia, ABC NT Tennant Creek	4910do	
0000	0100		Australia, Radio	9660pa	12080pa
			13670va	15240pa	17715va
			17775as	17795pa	17750as
0000	0100		Canada, CFRX Toronto ON	6070do	
0000	0100		Canada, CFVP Calgary AB	6030do	
0000	0100		Canada, CKZN St John's NF	6160do	
0000	0100		Canada, CKZU Vancouver BC	6160do	
0000	0100		Canada, Radio Canada Intl	9755am	
0000	0100		China, China Radio Intl	6020na	6075as
			7130as	7180as	9570na
					7345na
0000	0100		Costa Rica, University Network	5030va	
			6150va	7375va	9725va
0000	0100	f	Germany, Bible Voice Broadcasting	6140as	
0000	0100		Germany, Deutsche Welle	9695as	9825as
			9885as		
0000	0100		Guyana, Voice of	3290do	
0000	0100		Italy, RAI Intl	11800na	
0000	0100		Japan, Radio Japan/NHK World	6145na	
0000	0100		Malaysia, RTM/Trax FM	7295as	
0000	0100	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
0000	0100		Netherlands, Radio	9845na	
0000	0100		New Zealand, Radio NZ Intl	15720pa	
0000	0100	vl	Papua New Guinea, Wantok R.Light	7120va	
0000	0100		Singapore, MediaCorp Radio	6150do	
0000	0100		UK, BBC World Service	6195as	9410as
			11955as	15280as	15310as
					17790as
0000	0100	DRM	UK, BBC World Service	6010na	
0000	0100		USA, Armerican Forces Radio	4319usb	5446usb
			5765usb	6350usb	7590usb
			10320usb	12133usb	12579usb
			13855usb		13362usb
0000	0100		USA, KAIJ Dallas TX	5755na	
0000	0100		USA, KTBN Salt Lake City UT	7505na	
0000	0100		USA, KWHR Naalehu HI	17655as	
0000	0100		USA, WBCQ Kennebunk ME	5110na	7415na
			9330na		
0000	0100		USA, WBOH Newport NC	5920am	
0000	0100		USA, WEWN Birmingham AL	5035va	5835va
0000	0100		USA, WHRA Greenbush ME	7520na	
0000	0100	m	USA, WHRI Noblesville IN	7490am	7555am
0000	0100	twhfa	USA, WHRI Noblesville IN	9820am	13760am
0000	0100		USA, WINB Red Lion PA	9265am	
0000	0100	twhfa	USA, WRMI Miami FL	7385am	
0000	0100	sm	USA, WRMI Miami FL	9955am	
0000	0100		USA, WTJC Newport NC	9370na	
0000	0100		USA, WWCN Nashville TN	3215na	5070na
			7465na	13845na	
0000	0100		USA, WWRB Manchester TN	3185na	5050na
			5745na	6890na	
0000	0100		USA, WYFR Okeechobee FL	6065am	9505am
			11835am		
0000	0100		Zambia, Christian Voice	4965af	
0015	0030	a	Austria, Radio Austria Intl	9870am	
0030	0045	s	Germany, Pan American BC	9640as	
0030	0100		Australia, Radio	15415as	
0030	0100		Lithuania, Radio Vilnius	11690na	
0030	0100		Thailand, Radio	5890na	
0030	0100		UK, BBC World Service	5970as	6195as
			9410as	9790as	11955as
			15310as	15360as	15280as
0030	0100		USA, Voice of America	9715va	9780va
			15185va	15205va	15290va
			17740va	17820va	15560va
0035	0100	sm	Austria, Radio Austria Intl	9870am	
0043	0058	twhfa	Austria, Radio Austria Intl	9870am	

# 0100 UTC - 9PM EDT / 8PM CDT / 6PM PDT

0100	0115		Italy, RAI Intl	11800na	
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0100	0127		Czech Rep, Radio Prague	6200na	7345na
			9440na		
0100	0129	s	Germany, Universal Life	9430as	
0100	0130		Australia, Radio	17775as	
0100	0130		Hungary, Radio Budapest	9590na	
0100	0130		Slovakia, Radio Slovakia Intl	5930na	9440sa
0100	0130		Vietnam, Voice of	6175na	
0100	0159		Canada, Radio Canada Intl	9755am	13710na
0100	0200		Anguilla, Caribbean Beacon	6090am	
0100	0200		Australia, ABC NT Katherine	5025do	
0100	0200		Australia, ABC NT Tennant Creek	4910do	
0100	0200		Australia, Radio	9660pa	12080pa
			13670va	15415as	15240pa
			17750as	17795pa	17715as
0100	0200		Canada, CFRX Toronto ON	6070do	
0100	0200		Canada, CFVP Calgary AB	6030do	
0100	0200		Canada, CKZN St John's NF	6160do	
0100	0200		Canada, CKZU Vancouver BC	6160do	
0100	0200		China, China Radio Intl	6005na	6020na
			6075as	7180as	9570na
					9580na
0100	0200		Costa Rica, University Network	5030va	
			6150va	7375va	9725va
0100	0200		Cuba, Radio Havana	6000na	6060na
			9820na		
0100	0200	f	Germany, Bible Voice Broadcasting	6140as	
0100	0200		Guyana, Voice of	3291do	
0100	0200		Indonesia, Voice of	9525as	11785pa
			15150al		
0100	0200		Japan, Radio Japan/NHK World	5960va	
			11720va	11935sa	15325as
			17810as	17825va	17845as
0100	0200		Malaysia, RTM/Trax FM	7295as	
0100	0200	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
0100	0200		Netherlands, Radio	9845na	
0100	0200		New Zealand, Radio NZ Intl	15720pa	
0100	0200		North Korea, Voice of Korea	7140as	9345as
			9730am	11735ca	13760ca
					15180ca
0100	0200	vl	Papua New Guinea, Wantok R.Light	7120va	
0100	0200		Romania, Radio Romania Intl	9690na	11825na
0100	0200		Russia, Voice of	7250na	9665na
			15595na		15555na
0100	0200		Singapore, MediaCorp Radio	6150do	
0100	0200		Taiwan, Radio Taiwan Intl	15465na	11875sa
0100	0200		UK, BBC World Service	6195as	9410as
			11955as	15280as	15310as
					15360as
0100	0200		Ukraine, Radio Ukraine Intl	5830na	
0100	0200		USA, Armerican Forces Radio	4319usb	5446usb
			5765usb	6350usb	7590usb
			10320usb	12133usb	12579usb
			13855usb		13362usb
0100	0200		USA, KAIJ Dallas TX	5755na	
0100	0200		USA, KTBN Salt Lake City UT	7505na	
0100	0200		USA, KWHR Naalehu HI	17655as	
0100	0200		USA, Voice of America	9885va	11705va
			11725va		
0100	0200		USA, WBCQ Kennebunk ME	5110na	7415na
			9330na		
0100	0200		USA, WBOH Newport NC	5920am	
0100	0200		USA, WEWN Birmingham AL	5035va	5835va
0100	0200		USA, WHRA Greenbush ME	5850na	
0100	0200		USA, WHRI Noblesville IN	5875am	7490am
			9515am		
0100	0200	sm	USA, WHRI Noblesville IN	7315am	
0100	0200		USA, WINB Red Lion PA	9265am	
0100	0200	twhfa	USA, WRMI Miami FL	7385am	
0100	0200	sm	USA, WRMI Miami FL	9955am	
0100	0200		USA, WTJC Newport NC	9370na	
0100	0200		USA, WWCN Nashville TN	3215na	5070na
			5935na	7465na	
0100	0200		USA, WWRB Manchester TN	3185na	5050na
			5745na	6890na	
0100	0200		USA, WYFR Okeechobee FL	6065va	9505va
			15195va		
0100	0200		Uzbekistan, Christian Vision	7355as	
0100	0200		Zambia, Christian Voice	4965af	
0105	0130	sm	Austria, Radio Austria Intl	9870am	
0113	0130	twhf	Austria, Radio Austria Intl	9870am	
0113	0200	sm	Austria, Radio Austria Intl	9870na	
0115	0130	twhf	Armenia, FEBA	7365as	
0130	0200		Iran, Voice of the Islamic Rep	7235am	9495am
0130	0200		Sweden, Radio	6010na	9435va
0130	0200	twhfa	USA, Voice of America	7405am	13740am
0140	0200		Vatican City, Vatican Radio	7335as	9650as
0143	0158	twhfa	Austria, Radio Austria Intl	9870na	
0145	0200	mtwhfa	Albania, Radio Tirana	6115eu	7455eu

# 0200 UTC - 10PM EDT / 9PM CDT / 7PM PDT

0200	0230		Iran, Voice of the Islamic Rep	7235am	9495am
0200	0245		USA, WYFR Okeechobee FL	11835va	
0200	0300		Anguilla, Caribbean Beacon	6090am	

0200	0300	twhfa	Argentina, RAE	11710am		
0200	0300		Australia, ABC NT Alice Springs	4835do	2310irr	
0200	0300		Australia, ABC NT Katherine	5025do		
0200	0300		Australia, ABC NT Tennant Creek		4910do	
0200	0300		Australia, Radio	9660pa 12080pa 13630pa		
			13670va 15415as 15240pa 15515pa			
			17750as 21725va			
0200	0300		Bulgaria, Radio	9700na 11700na		
0200	0300		Canada, CFRX Toronto ON	6070do		
0200	0300		Canada, CFVP Calgary AB	6030do		
0200	0300		Canada, CKZN St John's NF	6160do		
0200	0300		Canada, CKZU Vancouver BC	6160do		
0200	0300		China, China Radio Intl	11770as	13640as	
0200	0300		Costa Rica, University Network	6150va 7375va	9725va	5030va
0200	0300		Cuba, Radio Havana	6000na	6060na	
			9820na			
0200	0300		Egypt, Radio Cairo	7270na		
0200	0300		Guyana, Voice of	3291do		
0200	0300		Malaysia, RTM/Trax FM	7295as		
0200	0300	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do 6175do			
0200	0300		New Zealand, Radio NZ Intl	15720pa		
0200	0300		North Korea, Voice of Korea	13650as	15100as	
0200	0300	vl	Papua New Guinea, Wantok R.Light	7120va		
0200	0300		Philippines, Radio Pilipinas	11885va	15270va	
			17665va			
0200	0300		Russia, Voice of	9665na 9860na	15555na	
			15595na			
0200	0300		Singapore, MediaCorp Radio	6150do		
0200	0300		South Korea, KBS World Radio	11810sa 15575na	9560na	
0200	0300		UK, BBC World Service	6195me 11760me		
			11955as 15280as 15310as 15360as			
			17790as			
0200	0300		USA, Armerican Forces Radio	4319usb 5446usb		
			5765usb 6350usb 7590usb 7812usb			
			10320usb 12133usb 13362usb			
			13855usb			
0200	0300		USA, KAIJ Dallas TX	5755na		
0200	0300		USA, KJES Vado NM	7555na		
0200	0300		USA, KTBN Salt Lake City UT	7505na		
0200	0300		USA, KWHR Naalehu HI	17655as		
0200	0300		USA, WBCQ Kennebunk ME	5110na	7415na	
			9330na			
0200	0300		USA, WBOH Newport NC	5920am		
0200	0300		USA, WEWN Birmingham AL	5035va	5835va	
0200	0300		USA, WHRA Greenbush ME	5850na		
0200	0300	sm	USA, WHRI Noblesville IN	7315am		
0200	0300		USA, WHRI Noblesville IN	5875am	7490am	
			9515am			
0200	0300		USA, WINB Red Lion PA	9265am		
0200	0300	twhfa	USA, WRMI Miami FL	7385am		
0200	0300	sm	USA, WRMI Miami FL	9955am		
0200	0300		USA, WTJC Newport NC	9370na		
0200	0300		USA, WWCR Nashville TN	3215na	5070na	
			5935na 7465na			
0200	0300		USA, WWRB Manchester TN	3185na	5050na	
			5745na 6890na			
0200	0300		USA, WYFR Okeechobee FL	5985va	6065va	
			9505va 11855va			
0200	0300		Uzbekistan, Christian Vision	7355as		
0200	0300		Zambia, Christian Voice	4965af		
0200	3000		Taiwan, Radio Taiwan Intl	5950na	9680na	
0215	0220		Vatican City, Vatican Radio	15560oc		
0215	0230		Nepal, Radio	3230as	5005as	6100as
			7165as			
0230	0300	mtwhfa	Albania, Radio Tirana	6115eu	7455eu	
0230	0300		Hungary, Radio Budapest	9765eu		
0230	0300		Sweden, Radio	6010na		
0230	0300		Vietnam, Voice of	6175na		
0245	0300		Myanmar, Radio	9730do		
0250	0300		Vatican City, Vatican Radio	7305am	9605am	

## 0300 UTC - 11PM EDT / 10PM CDT / 8PM PDT

0300	0315		Croatia, Croatian Radio	9925na		
0300	0327		Czech Rep, Radio Prague	7345na	9870na	
0300	0330		Egypt, Radio Cairo	7270na		
0300	0330		Myanmar, Radio	9730do		
0300	0330		Philippines, Radio Pilipinas	11885va	15270va	
			17665va			
0300	0330		Thailand, Radio	5890na		
0300	0330		UK, BBC World Service	3255af 6005af		
			6035af 6190af 7160af 9750af			
			12035af			
0300	0330		USA, KJES Vado NM	7555na		
0300	0330		USA, Voice of America	4930af 6080af		
			7340af 9885af 12080af 15580af			
0300	0330		Vatican City, Vatican Radio	9660af		
0300	0330	vl	Vietnam, Voice of	6175am		

0300	0355		South Africa, Channel Africa	5960af		
0300	0400		Anguilla, Caribbean Beacon	6090am		
0300	0400		Australia, ABC NT Alice Springs	4835do	2310irr	
			Australia, ABC NT Katherine	5025do		
0300	0400		Australia, ABC NT Tennant Creek		4910do	
0300	0400		Australia, Radio	9660pa 12080pa 13630pa		
			13670va 15415as 15240pa 15515pa			
			17750as 21725va			
0300	0400	twhf	Canada, CBC NQ SW Service	9625na		
0300	0400		Canada, CFRX Toronto ON	6070do		
0300	0400		Canada, CFVP Calgary AB	6030do		
0300	0400		Canada, CKZN St John's NF	6160do		
0300	0400		Canada, CKZU Vancouver BC	6160do		
0300	0400		China, China Radio Intl	9690na	9790na	
			11770as 15110as 15120as			
0300	0400		Costa Rica, University Network	6150va 7375va	9725va	5030va
0300	0400		Cuba, Radio Havana	6000na	6060na	
			9820na			
0300	0400		Guyana, Voice of	3291do		
0300	0400		Japan, Radio Japan/NHK World		21610oc	
0300	0400		Malaysia, RTM/Trax FM	7295as		
0300	0400		Malaysia, Voice of	6175as 9750as	15295as	
0300	0400	vl	Namibia, Namibian BC Corp	3270do	3290do	
			6060do 6175do			
0300	0400		New Zealand, Radio NZ Intl	15720pa		
0300	0400		North Korea, Voice of Korea	7140as	9345as	
			9730as			
0300	0400		Oman, Radio Oman	15355as		
0300	0400	vl	Papua New Guinea, Wantok R.Light	7120va		
0300	0400		Russia, Voice of	9665na 9860na	9880na	
			15425na 15455na 15555na			
0300	0400	vl	Rwanda, Radio	6055do		
0300	0400		Singapore, MediaCorp Radio	6150do		
0300	0400		South Africa, Channel Africa	3345af		
0300	0400		Taiwan, Radio Taiwan Intl	5950na	15215sa	
			15310as			
0300	0400		Turkey, Voice of	6140va 7270va		
0300	0400		UK, BBC World Service	6195va	9410eu	
			11760me 15575me			
0300	0400	vl/ mtwhf	UK, Sudan Radio Service	7120va		
0300	0400		Ukraine, Radio Ukraine Intl	5810na		
0300	0400		USA, Armerican Forces Radio	4319usb 5446usb		
			5765usb 6350usb 7590usb 7812usb			
			10320usb 12133usb 12579usb 13362usb			
			13855usb			
0300	0400		USA, KAIJ Dallas TX	5755na		
0300	0400		USA, KTBN Salt Lake City UT	7505na		
0300	0400		USA, KWHR Naalehu HI	17655as		
0300	0400		USA, WBCQ Kennebunk ME	5110na	7415na	
			9330na			
0300	0400		USA, WBOH Newport NC	5920am		
0300	0400		USA, WEWN Birmingham AL	5035va	5835va	
0300	0400		USA, WHRA Greenbush ME	5850na		
0300	0400	twhfa	USA, WHRI Noblesville IN	5860am		
0300	0400	sm	USA, WHRI Noblesville IN	7520am		
0300	0400		USA, WHRI Noblesville IN	5875am	7315am	
0300	0400		USA, WINB Red Lion PA	9265am		
0300	0400	twhfa	USA, WRMI Miami FL	7385am		
0300	0400	sm	USA, WRMI Miami FL	9955am		
0300	0400		USA, WTJC Newport NC	9370na		
0300	0400		USA, WWCR Nashville TN	3215na	5070na	
			5765na 5935na			
0300	0400		USA, WWRB Manchester TN	3185na	5050na	
			5745na 6890na			
0300	0400		USA, WYFR Okeechobee FL	6065am	9505am	
			11740am 15255am			
0300	0400		Uzbekistan, Christian Vision	13685as		
0300	0400		Zambia, Christian Voice	4965af		
0300	0400	vl	Zimbabwe, ZBC Corp	5975do		
0330	0345		Israel, Kol Israel	7530va 9345va	11590va	
			13720va 17600pa			
0330	0357		Czech Rep, Radio Prague	9445va	11600va	
0330	0400		UK, BBC World Service	3255af 6005af		
			6035af 6190af 7160af 9750af			
			12035af 15420af			
0330	0400		USA, Voice of America	4930af 6080af		
			9885af 12080af 12080af 15580af			

## 0400 UTC - 12AM EDT / 11PM CDT / 9PM PDT

0400	0430	mtwhf	France, Radio France Intl	9805af	11700af	
0400	0430		USA, Voice of America	4930af	4960af	
			6080af 7405af 9575af 9885af			
			11835af 12080af 15580af			
0400	0430	vl	Vietnam, Voice of	6175na		
0400	0445		USA, WYFR Okeechobee FL	6065va	6855va	
			9505va			
0400	0459		South Africa, Channel Africa	3345af		
0400	0500		Anguilla, Caribbean Beacon	6090am		
0400	0500		Australia, ABC NT Alice Springs		2310irr	



		4835do		
0400	0500	Australia, ABC NT Katherine	5025do	
0400	0500	Australia, ABC NT Tennant Creek	4910do	
0400	0500	Australia, Radio 9660pa	12080pa	13670va
		15240pa	15515pa	21725va
0400	0500	twhf	Canada, CBC NQ SW Service	9625na
0400	0500		Canada, CFRX Toronto ON	6070do
0400	0500		Canada, CKZN St John's NF	6160do
0400	0500		Canada, CKZU Vancouver BC	6160do
0400	0500		China, China Radio Intl	6190na
0400	0500		Costa Rica, University Network	9755na
		6150va	7375va	5030va
0400	0500		Cuba, Radio Havana	9725va
		9820na	6000na	6060na
0400	0500		Germany, Deutsche Welle	7225af
		12045af	15445af	9630af
0400	0500		Guyana, Voice of	3291do
0400	0500		Malaysia, RTM/Trax FM	7295as
0400	0500		Malaysia, Voice of 6175as	9750as
0400	0500	vl	Namibia, Namibian BC Corp	3270do
		6060do	6175do	3290do
0400	0500		New Zealand, Radio NZ Intl	15720pa
0400	0500		Nigeria, Radio/Kaduna	6090do
0400	0500	vl	Papua New Guinea, Wantok R.Light	7120va
0400	0500		Romania, Radio Romania Intl	9780va
		15110va	17870va	11820va
0400	0500		Russia, Voice of	9665na
		15555na	9860na	9880na
0400	0500	vl	Rwanda, Radio	6055do
0400	0500		Singapore, MediaCorp Radio	6150do
0400	0500	vl	Uganda, Radio	4976do
0400	0500		UK, BBC World Service	5026do
			6190af	7196do
			9410va	3255af
			15310as	6005af
			17760as	7120af
			15360as	7160af
			17790as	12035af
			6010na	15280as
0400	0500	DRM	UK, BBC World Service	15575me
0400	0500	vl/ mtwhf	UK, Sudan Radio Service	
0400	0500		USA, Armerican Forces Radio	6010na
			5765usb	7120va
			10320usb	4319usb
			13855usb	5446usb
			6350usb	7812usb
			12133usb	12579usb
			13362usb	
0400	0500		USA, KALJ Dallas TX	5755na
0400	0500		USA, KTNB Salt Lake City UT	7505na
0400	0500		USA, KWHR Naalehu HI	17655as
0400	0500		USA, WBCQ Kennebunk ME	5110na
			9330na	7415na
0400	0500		USA, WBOH Newport NC	5920am
0400	0500		USA, WEWN Birmingham AL	5035va
0400	0500		USA, WHRA Greenbush ME	5850na
0400	0500	twhfa	USA, WHRI Noblesville IN	5860am
0400	0500	sm	USA, WHRI Noblesville IN	7520am
0400	0500		USA, WHRI Noblesville IN	5875am
0400	0500		USA, WMLK Bethel PA	7315am
0400	0500		USA, WRMI Miami FL	9265eu
0400	0500		USA, WTJC Newport NC	9955eu
0400	0500		USA, WWCR Nashville TN	9370na
			5765na	5070na
0400	0500		USA, WWRB Manchester TN	3185na
			5745na	5050na
0400	0500		USA, WYFR Okeechobee FL	6890na
0400	0500		Uzbekistan, Christian Vision	7780va
0400	0500		Zambia, Christian Voice	13685as
0400	0500	vl	Zimbabwe, ZBC Corp	4965af
0400	0500		Netherlands, Radio	5975do
0430	0500		Australia, Radio	6165am
0430	0500		Nigeria, Radio/Ibadan	15415as
0430	0500		Nigeria, Radio/Kaduna	6050do
0430	0500		Nigeria, Radio/Lagos	4770do
0430	0500		Swaziland, TWR	3326do
0430	0500		USA, Voice of America	4775af
			6080af	4930af
			12080af	4960af
			15580af	11835af
0445	0500		Italy, RAI Intl	9575af
			6015va	6110af
				7235va

### 0500 UTC - 1AM EDT / 12AM CDT / 10PM PDT

0500	0507	twhf	Canada, CBC NQ SW Service	9625na	
0500	0520		Vatican City, Vatican Radio	4005eu	5885eu
			7250eu		
0500	0530	mtwhf	France, Radio France Intl	13680af	15160af
0500	0530	vl	Rwanda, Radio	6055do	
0500	0530		UK, BBC World Service	6005af	6190af
			6195eu	7160af	11765af
			11955as	15280as	15310as
			15420af	17640af	15360as
			17885af	21660as	17790as
0500	0530		Vatican City, Vatican Radio	9660af	11625af
			13765af		
0500	0555		South Africa, Channel Africa	9685af	
0500	0600		Anguilla, Caribbean Beacon	6090am	
0500	0600		Australia, ABC NT Alice Springs		2310irr

		4835do		
0500	0600	Australia, ABC NT Katherine	5025do	
0500	0600	Australia, ABC NT Tennant Creek	4910do	
0500	0600	Australia, Radio 9660pa	12080pa	13630pa
		13670pa	15160va	15240pa
			15515pa	
			17750as	
0500	0600	Bhutan, BBS	6035as	
0500	0600	Canada, CFRX Toronto ON	6070do	
0500	0600	Canada, CKZN St John's NF	6160do	
0500	0600	Canada, CKZU Vancouver BC	6160do	
0500	0600	China, China Radio Intl	5960na	6190na
0500	0600		7220af	11750as
			15465as	15350as
			17505va	17540as
0500	0600	Costa Rica, University Network		5030va
		6150va	7375va	9725va
0500	0600	Cuba, Radio Havana	6000va	6060va
		9550va	9820va	11760va
0500	0600	Germany, Deutsche Welle	9630af	9700af
		15410af	17800af	
0500	0600	Germany, The Voice Africa	9430af	
0500	0600	Guyana, Voice of	3291do	
0500	0600	Italy, IRRS	5775va	
0500	0600	Japan, Radio Japan/NHK World		5975eu
		6110na	7230eu	15195as
			21755oc	17810as
0500	0600	Malaysia, RTM/Trax FM	7295as	
0500	0600	Malaysia, Voice of 6175as	9750as	15295as
0500	0600	Namibia, Namibian BC Corp	3270do	3290do
		6060do	6175do	
0500	0600	New Zealand, Radio NZ Intl	15720pa	
0500	0600	Nigeria, Radio/Ibadan	6050do	
0500	0600	Nigeria, Radio/Kaduna	4770do	6090do
0500	0600	Nigeria, Radio/Lagos	3326do	4990do
0500	0600	Nigeria, Voice of	15120af	
0500	0600	Papua New Guinea, Wantok R.Light		7120va
0500	0600	Russia, Voice of	17635oc	21790oc
0500	0600	Singapore, MediaCorp Radio	6150do	
0500	0600	South Africa, Channel Africa	7240af	
0500	0600	Swaziland, TWR	3200af	4775af
0500	0600	Uganda, Radio	4976do	9500af
0500	0600	UK, BBC World Service	11760me	7196do
0500	0600	vl/ mtwhf	UK, Sudan Radio Service	15575me
0500	0600		9525va	
			USA, Armerican Forces Radio	4319usb
			5765usb	5446usb
			6350usb	7590usb
			10320usb	7812usb
			12133usb	12579usb
			13362usb	
0500	0600		USA, KALJ Dallas TX	5755na
0500	0600		USA, KTNB Salt Lake City UT	7505na
0500	0600		USA, KWHR Naalehu HI	11565as
0500	0600		USA, Voice of America	4930af
			6180af	6080af
			7405af	12080af
0500	0600		USA, WBCQ Kennebunk ME	15580af
0500	0600		USA, WBOH Newport NC	5110na
0500	0600		USA, WEWN Birmingham AL	7415na
0500	0600		USA, WHRA Greenbush ME	5920am
0500	0600		USA, WHRI Noblesville IN	5050va
0500	0600	twhfa	USA, WHRI Noblesville IN	5850va
0500	0600	sm	USA, WMLK Bethel PA	6145na
0500	0600		USA, WRMI Miami FL	5860am
0500	0600		USA, WTJC Newport NC	7465am
0500	0600		USA, WWCR Nashville TN	7315am
0500	0600		5765na	9955eu
0500	0600		USA, WWRB Manchester TN	9265eu
0500	0600		USA, WYFR Okeechobee FL	9955am
0500	0600		Uzbekistan, Christian Vision	9370na
0500	0600		Zambia, Christian Voice	3215na
0500	0600	vl	Zimbabwe, ZBC Corp	5070na
0505	0520	m	Austria, Radio Austria Intl	3185na
0505	0530	as	Austria, Radio Austria Intl	6855va
0515	0600		South Africa, The Voice Africa	9355va
0525	0600	vl	Ghana, Ghana BC Corp	13685as
0530	0600		Australia, Radio	4965af
0530	0600		Thailand, Radio	5975do
0530	0600		UK, BBC World Service	17870me
			6190af	17870me
			11765af	9555af
			11955as	3366do
			15420af	4915do
0530	0600	mtwhf	UK, BBC World Service	3255af
0535	0600	as	Austria, Radio Austria Intl	6005af
0545	0600	twhf	Austria, Radio Austria Intl	7160af
0545	0600	vl	Rwanda, Radio	15310as
				15360as
				17760as
				21660as

### 0600 UTC - 2AM EDT / 1AM CDT / 11PM PDT

0600	0615	as	South Africa, TWR11640af	
0600	0630	mtwhf	France, Radio France Intl	15160af
0600	0630		UK, BBC World Service	17800af
			9410af	6005af
			12095af	6190af
			17640af	11940af
0600	0645	mtwhf	South Africa, TWR11640af	
0600	0655		New Zealand, Radio NZ Intl	15720pa
0600	0655		South Africa, Channel Africa	15255af

0600	0659	South Africa, Channel Africa	7240af	
0600	0700	Anguilla, Caribbean Beacon	6090am	
0600	0700	Australia, ABC NT Alice Springs	4835do	2310irr
0600	0700	Australia, ABC NT Katherine	5025do	
0600	0700	Australia, ABC NT Tennant Creek	4910do	
0600	0700	Australia, CVC International	15335as	
0600	0700	Australia, Radio	9660pa	12080pa
		13630pa	13670va	15160pa
		15415as	15515pa	17750as
0600	0700	Canada, CFRX Toronto ON	6070do	
0600	0700	Canada, CFVP Calgary AB	6030do	
0600	0700	Canada, CKZN St John's NF	6160do	
0600	0700	Canada, CKZU Vancouver BC	6160do	
0600	0700	China, China Radio Intl	6115na	9590af
		11750af	11880as	15140as
		17540as	17540va	15465as
0600	0700	Costa Rica, University Network	6150va	5030va
		7375va	9725va	11870va
0600	0700	Cuba, Radio Havana	6000va	6060va
		9550va	9820va	11760va
0600	0700	Germany, Deutsche Welle	6140eu	7170af
		15275af	17860af	
0600	0700	Germany, The Voice Africa	15640af	
0600	0700	Ghana, Ghana BC Corp	3366do	4915do
0600	0700	Guyana, Voice of	3291do	
0600	0700	Japan, Radio Japan/NHK World	11715eu	
		11740as	11760eu	13630va
		17870pa	21755oc	15195as
0600	0700	Liberia, ELWA	4760do	
0600	0700	Malaysia, RTM/Trax FM	7295as	
0600	0700	Malaysia, Voice of 6175as	9750as	15295as
0600	0700	Namibia, Namibian BC Corp	3270do	3290do
		6060do	6175do	
0600	0700	Netherlands, Radio	9700pa	
0600	0700	Nigeria, Radio/Ibadan	6050do	
0600	0700	Nigeria, Radio/Kaduna	4770do	6090do
0600	0700	Nigeria, Radio/Lagos	3326do	4990do
0600	0700	Nigeria, Voice of 15120af		
0600	0700	Papua New Guinea, Wantok R.Light	7120va	
0600	0700	Russia, Voice of 17635oc	21790oc	
0600	0700	Sierra Leone, SLBS3316do		
0600	0700	Singapore, MediaCorp Radio	6150do	
0600	0700	Solomon Islands, SIBC	5020do	9545do
0600	0700	South Africa, The Voice Africa	9555af	
0600	0700	Swaziland, TWR	4775af	9500af
0600	0700	UK, BBC World Service	17885af	
0600	0700	UK, BBC World Service	6195eu	9410eu
		11955as	12095eu	15310as
		15565eu	15575me	17760as
		21660as		
0600	0700	USA, Armerican Forces Radio	4319usb	5446usb
		5765usb	6350usb	7590usb
		10320usb	12133usb	12579usb
		13855usb		13362usb
0600	0700	USA, KAIJ Dallas TX	5755na	
0600	0700	USA, KTBN Salt Lake City UT	7505na	
0600	0700	USA, KWHR Naalehu HI	11565as	13650as
0600	0700	USA, Voice of America	6080af	6180af
		7405af	12080af	15580af
0600	0700	USA, WBCQ Kennebunk ME	5110na	7415na
0600	0700	USA, WBOH Newport NC	5920am	
0600	0700	USA, WEWN Birmingham AL	5050va	7570va
0600	0700	USA, WHRA Greenbush ME	5860na	7490na
0600	0700	USA, WHRI Noblesville IN	7315am	7465am
0600	0700	USA, WMLK Bethel PA	9265eu	9955eu
0600	0700	USA, WRMI Miami FL	9955am	
0600	0700	USA, WTJC Newport NC	9370na	
0600	0700	USA, WWCR Nashville TN	3215na	5070na
		5765na	5935na	
0600	0700	USA, WWRB Manchester TN	3185na	
0600	0700	USA, WYFR Okeechobee FL	6000va	7780va
		9680va	11530va	11580
				skd0606
0600	0700	Uzbekistan, Christian Vision	13685as	
0600	0700	Vanuatu, Radio	4960do	
0600	0700	Yemen, Rep of Yemen Radio	9780me	
0600	0700	Zambia, Christian Voice	6065af	
0600	0700	Zimbabwe, ZBC Corp	5975do	
0630	0645	Vatican City, Vatican Radio	4005eu	5885eu
		6185eu	7250eu	9645eu
		15595va		11740eu
0630	0700	Bulgaria, Radio	9500eu	11500eu
0630	0700	Romania, Radio Romania Intl	9655va	11830va
		15440va	17770va	
0630	0700	UK, BBC World Service	6005af	6190af
		9410af	9530af	11765af
		11990af	12095af	17640af
0630	0700	Vatican City, Vatican Radio	11625af	13765af
		15570af	15595af	
0645	0700	Albania, TWR Europe	11865eu	
0645	0700	Monaco, TWR	9800eu	
0655	0700	New Zealand, Radio NZ Intl	9885pa	

## 0700 UTC - 3AM EDT / 2AM CDT / 12AM PDT

0700	0715	UK, BBC World Service	6005af	6190af
		11940af	11765af	15400af
		17640af	17830af	15485af
0700	0727	Czech Rep, Radio Prague	9880eu	11600eu
0700	0730	Slovakia, Radio Slovakia Intl	9440va	15460va
0700	0745	USA, WYFR Okeechobee FL	7780va	
0700	0800	Albania, TWR Europe	11865eu	
0700	0800	Anguilla, Caribbean Beacon	6090am	
0700	0800	Australia, ABC NT Alice Springs	4835do	2310irr
0700	0800	Australia, ABC NT Katherine	5025do	
0700	0800	Australia, ABC NT Tennant Creek	4910do	
0700	0800	Australia, CVC International	15335as	
0700	0800	Australia, HCJB	11750as	
0700	0800	Australia, Radio	9660pa	9710pa
		12080pa	13630pa	15160pa
		15415as	17750as	15240pa
0700	0800	Canada, CFRX Toronto ON	6070do	
0700	0800	Canada, CFVP Calgary AB	6030do	
0700	0800	Canada, CKZN St John's NF	6160do	
0700	0800	Canada, CKZU Vancouver BC	6160do	
0700	0800	China, China Radio Intl	11785eu	11880as
		15350as	15465as	17490eu
0700	0800	Costa Rica, University Network	6150va	5030va
		7375va	9725va	11870va
0700	0800	France, Radio France Intl	17800af	
0700	0800	Germany, Bible Voice Broadcasting	5945eu	
0700	0800	Germany, Deutsche Welle	6140eu	
0700	0800	Germany, The Voice Africa	15640af	
0700	0800	Ghana, Ghana BC Corp	3366do	4915do
0700	0800	Guyana, Voice of 3291do	5950do	
0700	0800	Italy, IRRS	13840va	
0700	0800	Liberia, ELWA	4760do	
0700	0800	Liberia, Star Radio 9525af		
0700	0800	Malaysia, RTM/Trax FM	7295as	
0700	0800	Malaysia, Voice of 6175as	9750as	15295as
0700	0800	Monaco, TWR	9800eu	11865eu
0700	0800	Myanmar, Radio	9730do	
0700	0800	Namibia, Namibian BC Corp	3270do	3290do
		6060do	6175do	
0700	0800	Netherlands, Radio	9700pa	
0700	0800	New Zealand, Radio NZ Intl	9885pa	
0700	0800	Nigeria, Radio/Ibadan	6050do	
0700	0800	Nigeria, Radio/Kaduna	4770do	6090do
0700	0800	Nigeria, Radio/Lagos	3326do	4990do
0700	0800	Papua New Guinea, Wantok R.Light	7120va	
0700	0800	Russia, Voice of 17495oc	17635oc	21790oc
0700	0800	Sierra Leone, SLBS3316do		
0700	0800	Singapore, MediaCorp Radio	6150do	
0700	0800	Solomon Islands, SIBC	5020do	9545do
0700	0800	South Africa, The Voice Africa	9555af	
0700	0800	Swaziland, TWR	4775af	9500af
0700	0800	Taiwan, Radio Taiwan Intl	5950na	
0700	0800	UK, BBC World Service	11955as	15310as
		15575me	17760va	17790as
		21660as		17885as
0700	0800	USA, Armerican Forces Radio	4319usb	5446usb
		5765usb	6350usb	7590usb
		10320usb	12133usb	12579usb
		13855usb		13362usb
0700	0800	USA, KAIJ Dallas TX	5755na	
0700	0800	USA, KTBN Salt Lake City UT	7505na	
0700	0800	USA, KWHR Naalehu HI	11565as	13650as
0700	0800	USA, WBCQ Kennebunk ME	5110na	7415na
0700	0800	USA, WBOH Newport NC	5920am	
0700	0800	USA, WEWN Birmingham AL	5050va	7570va
0700	0800	USA, WHRA Greenbush ME	5860na	7490na
0700	0800	USA, WHRI Noblesville IN	7315am	7495am
0700	0800	USA, WMLK Bethel PA	9265eu	9955eu
0700	0800	USA, WRMI Miami FL	9955am	
0700	0800	USA, WTJC Newport NC	9370na	
0700	0800	USA, WWCR Nashville TN	3215na	5070na
		5765na	5935na	
0700	0800	USA, WWRB Manchester TN	3185na	
0700	0800	USA, WYFR Okeechobee FL	5985va	6855va
		9505va	9715va	9930va
0700	0800	Vanuatu, Radio	4960do	
0700	0800	Zambia, Christian Voice	6065af	
0715	0745	Monaco, TWR	9800eu	11865eu
0715	0750	Albania, TWR Europe	11865eu	
0715	0750	Monaco, TWR	9800eu	11865eu
0730	0800	Guam, TWR/KTWR17570as		
0730	0800	Pakistan, Radio	15100eu	17835eu
0730	0800	UK, BBC World Service	6190af	11765af
		11940af	15400af	15485af
		17830af		17640af
0740	0800	Guam, TWR/KTWR17570as		



# 0800 UTC - 4AM EDT / 3AM CDT / 1AM PDT

0800	0820	smtwhf	Albania, TWR Europe	11865eu	
0800	0820		Monaco, TWR	9800eu	11865eu
0800	0830		Australia, ABC NT Katherine	5025do	
0800	0830		Australia, ABC NT Tennant Creek		4910do
0800	0830		Liberia, ELWA	4760do	
0800	0830		Malaysia, Voice of	6175as	9750as
0800	0830		Myanmar, Radio	9730do	
0800	0830		Pakistan, Radio	15100eu	17835eu
0800	0830		Swaziland, TWR	4775af	6120af
0800	0845	fas	Germany, Bible Voice Broadcasting		5945eu
0800	0845		USA, WYFR Okeechobee FL	5950va	9930va
0800	0900		Anguilla, Caribbean Beacon	6090am	
0800	0900		Australia, ABC NT Alice Springs		2310irr
			4835do		
0800	0900		Australia, CVC International	15335as	
0800	0900		Australia, HCJB	11750as	
0800	0900		Australia, Radio	5995pa	9580pa 9590pa
			9710pa	12080pa	13630pa 15240as
			17750as		
0800	0900		Bhutan, BBS	6035as	
0800	0900	DRM	Bulgaria, World Radio Network		13865 ei
0800	0900		Canada, CFRX Toronto ON	6070do	
0800	0900		Canada, CFVP Calgary AB	6030do	
0800	0900		Canada, CKZN St John's NF	6160do	
0800	0900		Canada, CKZU Vancouver BC	6160do	
0800	0900		China, China Radio Intl	11785eu	11880as
			15350as	15465as	17490eu 17540as
0800	0900		Costa Rica, University Network		5030va
			6150va	7375va	9725va 11870va
0800	0900		Germany, Deutsche Welle	6140eu	
0800	0900		Germany, The Voice Africa	15640af	
0800	0900	vl	Ghana, Ghana BC Corp	3366do	4915do
0800	0900		Guam, TWR/KTWR11840as	17570as	
0800	0900		Guyana, Voice of	3291do	5950do
0800	0900		Indonesia, Voice of		9525as 11785pa
			15150al		
0800	0900	vl	Italy, IRRS	13840va	
0800	0900		Liberia, Star Radio	9525af	
0800	0900		Malaysia, RTM/Trax FM		7295as
0800	0900		Malaysia, Voice of	15295as	
0800	0900		New Zealand, Radio NZ Intl	9885pa	
0800	0900		Nigeria, Radio/Ibadan	6050do	
0800	0900		Nigeria, Radio/Kaduna	4770do	6090do
0800	0900		Nigeria, Radio/Lagos	3326do	4990do
0800	0900		Papua New Guinea, Catholic Radio		4960do
0800	0900		Papua New Guinea, NBC	4890do	
0800	0900	vl	Papua New Guinea, Wantok R.Light		7120va
0800	0900		Russia, Voice of	17495oc	17635oc
0800	0900	DRM	Russia, Voice of	15780eu	21790oc
0800	0900	irreg/ vl	Sierra Leone, SLBS3316do		
0800	0900		Singapore, MediaCorp Radio	6150do	
0800	0900	vl	Solomon Islands, SIBC	5020do	9545do
0800	0900	s	South Africa, Radio League	7205af	17695af
0800	0900		South Africa, The Voice Africa	9555af	
0800	0900		South Korea, KBS World Radio		9570as
			9640eu		
0800	0900		Taiwan, Radio Taiwan Intl	9610as	
0800	0900		UK, BBC World Service	6190af	6195as
			9740as	11760me	11940af 15310as
			15360as	15400af	15485af 15575me
			17640af	17760as	17790as 17830af
			17885af	21470af	21660as
0800	0900		USA, Armerican Forces Radio	4319usb	5446usb
			5765usb	6350usb	7590usb 7812usb
			10320usb	12133usb	12579usb 13362usb
			13855usb		
0800	0900		USA, KAIJ Dallas TX	5755na	
0800	0900		USA, KNLS Anchor Point AK	11765as	
0800	0900		USA, KTNB Salt Lake City UT	7505na	
0800	0900		USA, KWHR Naalehu HI	9930as	11565as
0800	0900		USA, WBOH Newport NC	5920am	
0800	0900		USA, WEWN Birmingham AL	5050na	7570na
0800	0900		USA, WHRA Greenbush ME	5860na	7490na
0800	0900		USA, WHRI Noblesville IN	7315am	7495am
0800	0900		USA, WMLK Bethel PA	9265eu	9955eu
0800	0900		USA, WRMI Miami FL	9955am	
0800	0900		USA, WTJC Newport NC	9370na	
0800	0900		USA, WWCR Nashville TN	3215na	5070na
			5765na	5935na	
0800	0900		USA, WWRB Manchester TN	3185na	
0800	0900		USA, WYFR Okeechobee FL	5985va	6855va
0800	0900	vl	Vanuatu, Radio	4960do	
0800	0900		Zambia, Christian Voice	6065af	
0815	0900	sm	Guam, TWR/KTWR11840as		
0830	0900		Australia, ABC NT Katherine	2485do	
0830	0900		Australia, ABC NT Tennant Creek		2325do
0830	0900		Australia, Radio	15415as	
0830	0900		Lithuania, Radio Vilnius	9710eu	
0845	0900	f	Germany, Bible Voice Broadcasting		17595va

# 0900 UTC - 5AM EDT / 4AM CDT / 2AM PDT

0900	0900		USA, WBCQ Kennebunk ME	5110na	7415na
0900	0915	vl	Ghana, Ghana BC Corp	3366do	4915do
0900	0927		Czech Rep, Radio Prague	9880eu	21745va
0900	0930		Guam, TWR/KTWR11840as		
0900	0957		China, China Radio Intl	15210pa	17490eu
			17690pa	17750as	
0900	1000		Anguilla, Caribbean Beacon	6090am	
0900	1000		Australia, ABC NT Alice Springs		2310do
			4835irr		
0900	1000		Australia, ABC NT Katherine	2485do	
0900	1000		Australia, ABC NT Tennant Creek		2325do
0900	1000		Australia, CVC International	11955as	
0900	1000		Australia, Radio	9580pa	9590pa 11880as
			15240as		
0900	1000	DRM	Bulgaria, World Radio Network		13865eu
0900	1000		Canada, CFRX Toronto ON	6070do	
0900	1000		Canada, CFVP Calgary AB	6030do	
0900	1000		Canada, CKZN St John's NF	6160do	
0900	1000		Canada, CKZU Vancouver BC	6160do	
0900	1000		Costa Rica, University Network		5030va
			6150va	7375va	9725va 11870va
			13750va		
0900	1000	f	Germany, Bible Voice Broadcasting		17595va
0900	1000		Germany, Deutsche Welle	6140eu	
0900	1000		Germany, Overcomer Ministries		6110eu
			13810eu		
0900	1000		Guyana, Voice of	3291do	5950do
0900	1000	vl	Italy, IRRS	13840va	
0900	1000		Malaysia, RTM/Trax FM		7295as
0900	1000		Malaysia, Voice of	15295as	
0900	1000	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
0900	1000		New Zealand, Radio NZ Intl	9885pa	
0900	1000		Nigeria, Radio/Ibadan	6050do	
0900	1000		Nigeria, Radio/Kaduna	4770do	6090do
0900	1000		Nigeria, Radio/Lagos	3326do	4990do
0900	1000		Papua New Guinea, Catholic Radio		4960do
0900	1000		Papua New Guinea, NBC	4890do	
0900	1000	vl	Papua New Guinea, Wantok R.Light		7120va
0900	1000	vl	Rwanda, Radio	6055do	
0900	1000	irreg/ vl	Sierra Leone, SLBS3316do		
0900	1000		Singapore, MediaCorp Radio	6150do	
0900	1000	vl	Solomon Islands, SIBC	5020do	9545do
0900	1000		South Africa, The Voice Africa	9555af	
0900	1000		UK, BBC World Service	6190af	6195as
			9605as	9740as	11940af 15310as
			15360as	15400af	15485af 17640af
			17760as	17830af	17885af 21470af
0900	1000		USA, Armerican Forces Radio	4319usb	5446usb
			5765usb	6350usb	7590usb 7812usb
			10320usb	12133usb	12579usb 13362usb
			13855usb		
0900	1000		USA, KAIJ Dallas TX	5755na	
0900	1000		USA, KTNB Salt Lake City UT	7505na	
0900	1000		USA, KWHR Naalehu HI	9930as	11565as
0900	1000		USA, WBCQ Kennebunk ME	5110na	7415na
0900	1000		USA, WBOH Newport NC	5920am	
0900	1000		USA, WEWN Birmingham AL	5050na	
0900	1000		USA, WHRI Noblesville IN	7315am	7520am
0900	1000		USA, WRMI Miami FL	9955am	
0900	1000		USA, WTJC Newport NC	9370na	
0900	1000		USA, WWCR Nashville TN	5070na	5765na
			5935na	9985na	
0900	1000		USA, WWRB Manchester TN	3185na	
0900	1000		USA, WYFR Okeechobee FL	5985va	6885va
			9755va		
0900	1000	vl	Vanuatu, Radio	4960do	
0900	1000		Zambia, Christian Voice	6065af	
0905	1000	s	Greece, Voice of	9420va	15630eu
0930	0945		Israel, Kol Israel	13680eu	15760eu
0930	1000		Australia, Radio	15415as	

# 1000 UTC - 6AM EDT / 5AM CDT / 3AM PDT

1000	1015	f	Germany, Bible Voice Broadcasting		17595va
1000	1030		Mongolia, Voice of	12085as	
1000	1030		UK, BBC World Service	6195as	9690as
			9740as	15310as	15360as 17760as
			17790as	21660as	
1000	1057		China, China Radio Intl	7135as	7215as
			15190as	15210pa	17490eu 17690pa
1000	1059		New Zealand, Radio NZ Intl	9885pa	
1000	1100		Anguilla, Caribbean Beacon	11775am	
1000	1100		Australia, ABC NT Alice Springs		2310do
			4835irr		
1000	1100		Australia, ABC NT Katherine	2485do	
1000	1100		Australia, ABC NT Tennant Creek		2325do
1000	1100		Australia, CVC International	11955as	
1000	1100		Australia, Radio	9580pa	9590pa 11880as
			15240as	15415as	

1000	1100	DRM	Bulgaria, World Radio Network	13865eu
1000	1100		Canada, CFRX Toronto ON	6070do
1000	1100		Canada, CFVP Calgary AB	6030do
1000	1100		Canada, CKZN St John's NF	6160do
1000	1100		Canada, CKZU Vancouver BC	6160do
1000	1100		Costa Rica, University Network	5030va
			6150va 7375va 9725va	11870va
			13750va	
1000	1100		Germany, Overcomer Ministries	6110eu
			13810eu	
1000	1100		Guyana, Voice of	3291do 5950do
1000	1100		India, All India Radio	13695oc 15020as
			15410as 17510as 17800as	17895oc
1000	1100	vl	Italy, IRRS	13840va
1000	1100		Japan, Radio Japan/NHK World	6120na
			9695as 11730as 17585va	17720me
			21755oc	
1000	1100		Malaysia, RTM/Trax FM	7295as
1000	1100		Malaysia, Voice of	15295as
1000	1100		Netherlands, Radio	12065as 13710as
			13820as	
1000	1100	DRM	Netherlands, Radio	7240eu
1000	1100		Nigeria, Voice of	7255af
1000	1100		North Korea, Voice of Korea	6185as 6285am
			9335ca 9850as	
1000	1100		Papua New Guinea, Catholic Radio	4960do
1000	1100		Papua New Guinea, NBC	4890do
1000	1100	vl	Papua New Guinea, Wantok R.Light	7120va
1000	1100		Singapore, Media Corp Radio	6150do
1000	1100	vl	Solomon Islands, SIBC	5020do 9545do
1000	1100		South Africa, Channel Africa	9620af
1000	1100		South Africa, The Voice Africa	9555af
1000	1100		UK, BBC World Service	6190af 11940af
			15485af 15575me	
1000	1100	as	UK, BBC World Service	15400af
1000	1100		USA, American Forces Radio	4319usb 5446usb
			5765usb 6350usb 7590usb	7812usb
			10320usb 12133usb	12579usb 13362usb
			13855usb	
1000	1100		USA, KALJ Dallas TX	5755na
1000	1100		USA, KNLS Anchor Point AK	9795as
1000	1100		USA, KTVN Salt Lake City UT	7505na
1000	1100		USA, KWHR Naalehu HI	9930as 11565as
1000	1100		USA, WBCQ Kennebunk ME	5110na 7415na
1000	1100		USA, WBOH Newport NC	5920am
1000	1100		USA, WEWN Birmingham AL	5050na
1000	1100		USA, WHRI Noblesville IN	7520am 7555am
1000	1100		USA, WINB Red Lion PA	9265am
1000	1100		USA, WRMI Miami FL	9955am
1000	1100		USA, WTJC Newport NC	9370na
1000	1100		USA, WWCR Nashville TN	5070na 5765na
			5935na 15825na	
1000	1100		USA, WWRB Manchester TN	3185na
1000	1100		USA, WYFR Okeechobee FL	5950va 5985va
			6855va 9755va	
1000	1100	mtwhf	Zambia, Christian Voice	6065af
1030	1045		Ethiopia, Radio	5990af 7110af 9704af
1030	1057		Czech Rep, Radio Prague	9880eu 11665va
1030	1100		Australia, HCJB	15400as
1030	1100		Iran, Voice of the Islamic Rep	15600as 17660as
1030	1100		UK, BBC World Service	6195as 9740as
			15310as 17760as 17790as	
1059	1100		New Zealand, Radio NZ Intl	9870pa

### 1100 UTC - 7AM EDT / 6AM CDT / 4AM PDT

1100	1130		Australia, HCJB	15400as
1100	1130		Australia, Radio	15240as
1100	1130		Iran, Voice of the Islamic Rep	15600as 17660as
1100	1130		UK, BBC World Service	6190af 11940af
			15400af 15485af 17640af	17830af
			17885af 21470af	
1100	1145		USA, WYFR Okeechobee FL	9550va 9755va
1100	1159	s	Germany, Universal Life	6055me
1100	1200		Anguilla, Caribbean Beacon	11775am
1100	1200		Australia, ABC NT Alice Springs	2310do
			4835irr	
1100	1200		Australia, ABC NT Katherine	2485do
1100	1200		Australia, ABC NT Tennant Creek	2325do
1100	1200		Australia, CVC International	13635as
1100	1200		Australia, Radio	5995pa 6020pa 9475as
			9560as 9580pa 9590pa	11880as
			12080pa	
1100	1200	DRM	Bulgaria, World Radio Network	13865eu
1100	1200	as	Canada, CBC NQ SW Service	9625na
1100	1200		Canada, CFRX Toronto ON	6070do
1100	1200		Canada, CFVP Calgary AB	6030do
1100	1200		Canada, CKZN St John's NF	6160do
1100	1200		Canada, CKZU Vancouver BC	6160do
1100	1200		China, China Radio Intl	5960na 13665eu
			17490eu	
1100	1200		Costa Rica, University Network	5030va

			6150va 7375va 9725va 11870va	
			13750va	
1100	1200		Ecuador, HCJB	12005am 21455am
1100	1200	1st a	Germany, Overcomer Ministries	6110eu
1100	1200	vl	Italy, IRRS	13840va
1100	1200		Japan, Radio Japan/NHK World	6120na
			9695as 11730as	
1100	1200	vl	Libya, Voice of Africa	17725af 21695af
1100	1200		Malaysia, RTM/Trax FM	7295as
1100	1200		Malaysia, Voice of	15295as
1100	1200		Netherlands, Radio	11675na
1100	1200		New Zealand, Radio NZ Intl	9870pa
1100	1200		Nigeria, Voice of	7255af
1100	1200		Papua New Guinea, Catholic Radio	4960do
1100	1200		Papua New Guinea, NBC	4890do
1100	1200	vl	Papua New Guinea, Wantok R.Light	7120va
1100	1200		Singapore, Radio Singapore Intl	6080as
			6150as	
1100	1200		South Africa, Channel Africa	9620af
1100	1200		South Africa, The Voice Africa	9555af
1100	1200		Taiwan, Radio Taiwan Intl	7445as
1100	1200		UK, BBC World Service	6195as 9740as
			11865va 15310as 15575me	17760as
			17790as	
1100	1200		Ukraine, Radio Ukraine Intl	9950eu
1100	1200		USA, American Forces Radio	4319usb 5446usb
			5765usb 6350usb 7590usb	7812usb
			10320usb 12133usb	12579usb 13362usb
			13855usb	
1100	1200		USA, KALJ Dallas TX	5755na
1100	1200		USA, KTVN Salt Lake City UT	7505na
1100	1200		USA, KWHR Naalehu HI	9930as 11565as
1100	1200		USA, Voice of America	15205va
1100	1200		USA, WBCQ Kennebunk ME	5110na 7415na
1100	1200		USA, WBOH Newport NC	5920am
1100	1200		USA, WEWN Birmingham AL	5050na
1100	1200		USA, WHRI Noblesville IN	7520am 7555am
1100	1200		USA, WINB Red Lion PA	9265am
1100	1200		USA, WRMI Miami FL	9955am
1100	1200		USA, WTJC Newport NC	9370na
1100	1200		USA, WWCR Nashville TN	5070na 5765na
			5935na 15825na	
1100	1200		USA, WWRB Manchester TN	3185na
1100	1200		USA, WWRB Manchester TN	3185na
1100	1200		USA, WYFR Okeechobee FL	5950va 5985va
			7780va 9625va	
1100	1200		Zambia, Christian Voice	6065af
1130	1159	a	Germany, Universal Life	6055me
1130	1200		Australia, HCJB	15425as
1130	1200		Bulgaria, Radio	11700eu
1130	1200		Guam, AWR/KSDA	15435as
1130	1200		UK, BBC World Service	6190af 11940af
			15485af 17640af	17885af
			21470af	
1130	1200		Vatican City, Vatican Radio	15595va 17515va
1130	1400	f	USA, WRMI Miami FL	17550af

### 1200 UTC - 8AM EDT / 7AM CDT / 5AM PDT

1200	1215	vl	Cambodia, National Radio	11940as
1200	1230		France, Radio France Intl	17815af 21620af
1200	1230		Malaysia, Voice of	15295as
1200	1230		UAE, AWR Africa	15365as
1200	1245		USA, WYFR Okeechobee FL	5950am 5985am
1200	1259		Canada, Radio Canada Intl	9660as 15170as
1200	1259		New Zealand, Radio NZ Intl	9870pa
1200	1259		Poland, Radio Polonia	9525eu 11850eu
1200	1300		Anguilla, Caribbean Beacon	11775am
1200	1300		Australia, ABC NT Alice Springs	2310do
			4835irr	
1200	1300		Australia, ABC NT Katherine	2485do
1200	1300		Australia, ABC NT Tennant Creek	2325do
1200	1300		Australia, CVC International	13635as
1200	1300		Australia, Radio	5995pa 6020pa 9475as
			9560pa 9580pa 9590pa	11880pa
1200	1300	DRM	Bulgaria, World Radio Network	13865eu
1200	1300	as	Canada, CBC NQ SW Service	9625na
1200	1300		Canada, CFRX Toronto ON	6070do
1200	1300		Canada, CFVP Calgary AB	6030do
1200	1300		Canada, CKZN St John's NF	6160do
1200	1300		Canada, CKZU Vancouver BC	6160do
1200	1300		China, China Radio Intl	9730as 9760pa
			11760pa 11980as 13685eu	13790eu
			17490eu	
1200	1300		Costa Rica, University Network	9725va
			11870va 13750va	
1200	1300		Ecuador, HCJB	12005am 21455am
1200	1300		Germany, Overcomer Ministries	6110eu
			13810eu	
1200	1300	vl	Italy, IRRS	13840va
1200	1300	vl	Libya, Voice of Africa	17690af 21695af
1200	1300		Malaysia, RTM/Trax FM	7295as



1200	1300		Malaysia, Voice of 6175as		
1200	1300	DRM	Netherlands, Radio 7240eu		
1200	1300		Nigeria, Voice of 7255af		
1200	1300		Papua New Guinea, Catholic Radio 4960do		
1200	1300		Papua New Guinea, NBC 4890do		
1200	1300	vl	Papua New Guinea, Wantok R.Light 7120va		
1200	1300		Singapore, Radio Singapore Intl 6080as		
1200	1300		6150as		
1200	1300		South Africa, The Voice Africa 9555af		
1200	1300		South Korea, KBS World Radio 9650na		
1200	1300		Taiwan, Radio Taiwan Intl 7130na		
1200	1300		UK, BBC World Service 6190af 6195as		
			9740as 11865va 11940af 15310as		
			15485af 15575me 17640af 17760as		
			17790as 17830af 17885af 21470af		
1200	1300		USA, Armerican Forces Radio 4319usb 5446usb		
			5765usb 6350usb 7590usb 7812usb		
			10320usb 12133usb 12579usb 13362usb		
			13855usb		
1200	1300		USA, KAIJ Dallas TX 5755na		
1200	1300		USA, KNLS Anchor Point AK 9615as 9780as		
1200	1300		USA, KTBN Salt Lake City UT 7505na		
1200	1300		USA, KWHR Naalehu HI 11565as 12130as		
1200	1300		USA, Voice of America 6160va 9645va		
			9760va 11750va		
1200	1300		USA, WBCQ Kennebunk ME 5110na 7415na		
			9330na 17495na		
1200	1300		USA, WBOH Newport NC 5920am		
1200	1300		USA, WEWN Birmingham AL 5050na		
1200	1300		USA, WHRA Greenbush ME 15665na		
1200	1300		USA, WHRI Noblesville IN 9495am 9840am		
			12050am		
1200	1300		USA, WINB Red Lion PA 13570am		
1200	1300		USA, WRMI Miami FL 9955am		
1200	1300		USA, WTJC Newport NC 9370na		
1200	1300		USA, WWCN Nashville TN 7465na 9985na		
			13845na 15825na		
1200	1300		USA, WWRB Manchester TN 3185na		
1200	1300		USA, WYFR Okeechobee FL 17555am 17750am		
1200	1300		Zambia, Christian Voice 6065af		
1205	1220	m	Austria, Radio Austria Intl 6155eu 13730eu		
			17715va		
1205	1230	as	Austria, Radio Austria Intl 6155eu 13730eu		
			17715va		
1215	1230	twhf	Austria, Radio Austria Intl 17715va		
1215	1300		Egypt, Radio Cairo 17835as		
1230	1300		Sweden, Radio 13580va		
1230	1300		Thailand, Radio 9835va		
1230	1300		Turkey, Voice of 15225eu		
1235	1300	as	Austria, Radio Austria Intl 6155eu 13730eu		
			17715va		
1245	1300	m	Austria, Radio Austria Intl 17715va		
1245	1300	twhf	Austria, Radio Austria Intl 6155eu 13730eu		
			17715va		
1245	1300		Bangladesh, Bangla Betar 7185as		
1255	1258		Finland, YLE/Radio Finland 13715do 15400do		

### 1300 UTC - 9AM EDT / 8AM CDT / 6AM PDT

1300	1327		Czech Rep, Radio Prague 13580as 17540na		
1300	1330		Egypt, Radio Cairo 17835as		
1300	1330	DRM	Netherlands, Radio 7240eu		
1300	1330		Turkey, Voice of 15225eu 15535oc		
1300	1400		Anguilla, Caribbean Beacon 11775am		
1300	1400		Australia, CVC International 13635as		
1300	1400		Australia, Radio 5995pa 6020pa 9560pa		
			9580pa 9590pa		
1300	1400	DRM	Bulgaria, World Radio Network 13865eu		
1300	1400	as	Canada, CBC NQ SW Service 9625na		
1300	1400		Canada, CFRX Toronto ON 6070do		
1300	1400		Canada, CFVP Calgary AB 6030do		
1300	1400		Canada, CKZN St John's NF 6160do		
1300	1400		Canada, CKZU Vancouver BC 6160do		
1300	1400		Canada, Radio Canada Intl 9515am 13655am		
			17800am		
1300	1400		China, China Radio Intl 9570na 11760pa		
			11885pa 11900pa 11980as 13610eu		
			13790eu 15230na		
1300	1400		Costa Rica, University Network 9725va		
			11870va 13750va		
1300	1400		Germany, Deutsche Welle 6140eu		
1300	1400		Germany, Overcomer Ministries 6110eu		
			13810eu		
1300	1400	mtwhf	Italy, IRRS 13840va		
1300	1400	as	Italy, IRRS 15740va		
1300	1400		Jordan, Radio 11690na		
1300	1400	vl	Libya, Voice of Africa 17690af 17725af		
			21695af		
1300	1400		Malaysia, RTM/Trax FM 7295as		
1300	1400		Malaysia, Voice of 6175as		
1300	1400		New Zealand, Radio NZ Intl 7145pa		
1300	1400		Nigeria, Voice of 7255af		

1300	1400		North Korea, Voice of Korea 7570eu 9335na		
			11710na 12015eu		
1300	1400		Papua New Guinea, Catholic Radio 4960do		
1300	1400		Papua New Guinea, NBC 4890do		
1300	1400	vl	Papua New Guinea, Wantok R.Light 7120va		
1300	1400		Romania, Radio Romania Intl 11830eu 15105eu		
1300	1400		Singapore, Radio Singapore Intl 6080as		
			6150as		
1300	1400		South Africa, The Voice Africa 9555af		
1300	1400		South Korea, KBS World Radio 9570na		
			9770na		
1300	1400		UK, BBC World Service 6190af 6195as		
			9740as 11760me 11940af 12095eu		
			15310as 15420af 15485af 15565eu		
			15575me 17640va 17760as 17790as		
			17830af 17885af 21470af		
1300	1400		USA, Armerican Forces Radio 4319usb 5446usb		
			5765usb 6350usb 7590usb 7812usb		
			10320usb 12133usb 12579usb 13362usb		
			13855usb		
1300	1400		USA, KAIJ Dallas TX 5755na		
1300	1400		USA, KTBN Salt Lake City UT 7505na		
1300	1400		USA, KWHR Naalehu HI 12130as		
1300	1400		USA, Voice of America 9645va 9760va		
1300	1400		USA, WBCQ Kennebunk ME 5110na 7415na		
			9330na 17495na		
1300	1400		USA, WBOH Newport NC 5920am		
1300	1400		USA, WEWN Birmingham AL 5050na		
1300	1400		USA, WHRA Greenbush ME 15665na		
1300	1400		USA, WHRI Noblesville IN 9840am 11785am		
			12050am		
1300	1400		USA, WINB Red Lion PA 13570am		
1300	1400		USA, WRMI Miami FL 9955am		
1300	1400		USA, WTJC Newport NC 9370na		
1300	1400		USA, WWCN Nashville TN 7465na 9985na		
			13845na 15825na		
1300	1400		USA, WWRB Manchester TN 9385na		
1300	1400		USA, WYFR Okeechobee FL 11520va 11560va		
			11830va 11865va		
1300	1400		Zambia, Christian Voice 6065af		
1330	1400		Australia, HCJB 15405as		
1330	1400	DRM	Canada, Radio Canada Intl 7240eu		
1330	1400	twfha	Guam, AWR/KSDA 15275as		
1330	1400		Guam, TWR/KTWR9585as		
1330	1400		India, All India Radio 9690as 11620as		
			13710as		
1330	1400		Laos, National Radio 7145as		
1330	1400		Sweden, Radio 15240na 15735va		

### 1400 UTC - 10AM EDT / 9AM CDT / 7AM PDT

1400	1415	th	Germany, Pan American BC 15205me		
1400	1415		Russia, FEBA 9500as		
1400	1430		Thailand, Radio 9830va		
1400	1500		Anguilla, Caribbean Beacon 11775am		
1400	1500		Australia, CVC International 13635as		
1400	1500		Australia, HCJB 15390as		
1400	1500		Australia, Radio 5995pa 6020pa 6080as		
			7240pa 9590pa 9625as 11750as		
1400	1500	DRM	Bulgaria, World Radio Network 11540eu		
1400	1500	as	Canada, CBC NQ SW Service 9625na		
1400	1500		Canada, CFRX Toronto ON 6070do		
1400	1500		Canada, CFVP Calgary AB 6030do		
1400	1500		Canada, CKZN St John's NF 6160do		
1400	1500		Canada, CKZU Vancouver BC 6160do		
1400	1500		China, China Radio Intl 9560as 9700eu		
			9795eu 11765as 11775as 13610eu		
			13675na 13685af 13740na 15230na		
			17630af		
1400	1500		Costa Rica, University Network 9725va		
			11870va 13750va		
1400	1500		France, Radio France Intl 21620as		
1400	1500	as	Germany, Bible Voice Broadcasting 15690as		
1400	1500		Germany, Deutsche Welle 6140eu		
1400	1500	a	Greece, Voice of 9420va 9775va 12105va		
			15630va		
1400	1500		Guam, TWR/KTWR9975as		
1400	1500		India, All India Radio 9690as 11620as		
			13710as		
1400	1500	mtwhf	Italy, IRRS 13840va		
1400	1500	as	Italy, IRRS 15740va		
1400	1500		Japan, Radio Japan/NHK World 7200as		
			11730as 11840oc		
1400	1500		Jordan, Radio 11690na		
1400	1500		Libya, Voice of Africa 17850af 21695af		
1400	1500		Malaysia, RTM/Trax FM 7295as		
1400	1500		Malaysia, Voice of 6175as		
1400	1500		Netherlands, Radio 9345as 9890as		
			11835as		
1400	1500		New Zealand, Radio NZ Intl 7145pa		
1400	1500		Nigeria, Voice of 7255af		
1400	1500		Oman, Radio Oman 15140as		

1400 1500	vi	Papua New Guinea, Wantok R.Light	7120va
1400 1500		Russia, Voice of 7300eu 7390as 9745as	
		11755as 12055as 15605as 17645as	
1400 1500		Singapore, MediaCorp Radio	6150do
1400 1500		South Africa, The Voice Africa	9555af
1400 1500		Taiwan, Radio Taiwan Intl	15265as
1400 1500		UK, BBC World Service	6190af 6195as
		9740as 11940af 15310as 12095eu	
		15485va 15565eu 15575me 17640va	
		17760as 17790as 17830af 21470af	
		21660af	
1400 1500		USA, Armerican Forces Radio	4319usb 5446usb
		5765usb 6350usb 7590usb 7812usb	
		10320usb 12133usb 12579usb 13362usb	
		13855usb	
1400 1500		USA, KAIJ Dallas TX	13815na
1400 1500		USA, KJES Vado NM	11715na
1400 1500		USA, KNLS Anchor Point AK	9795as
1400 1500		USA, KTNB Salt Lake City UT	7505na
1400 1500		USA, KWHR Naalehu HI	9930as
1400 1500		USA, Voice of America	4930af 6080af
		7125va 9760va 13795af 15185af	
		15490af 15580af 17720af 17730af	
1400 1500		USA, WBCQ Kennebunk ME	5110na 7415na
		9330na 17495na	
1400 1500		USA, WBOH Newport NC	5920am
1400 1500		USA, WEWN Birmingham AL	9955na
1400 1500		USA, WHRA Greenbush ME	17650na
1400 1500		USA, WHRI Noblesville IN	9840am 11785am
		12050am	
1400 1500		USA, WINB Red Lion PA	13570am
1400 1500		USA, WRMI Miami FL	7385am
1400 1500		USA, WTJC Newport NC	9370na
1400 1500		USA, WWCR Nashville TN	9985na 12160na
		13845na 15825na	
1400 1500		USA, WWRB Manchester TN	9385na
1400 1500		USA, WYFR Okeechobee FL	11520va 11560va
		11830va 11910va 13695va 17750va	
1400 1500		Zambia, Christian Voice	6065af
1400 2500		South Africa, Channel Africa	9620af
1415 1430		Nepal, Radio 3230as 5005as 6100as	
		7165as	
1430 1445	s	Germany, Pan American BC	15205as 15650as
1430 1500		Australia, Radio 9475as 11660as	
1430 1500	DRM	South Korea, KBS World Radio	9770eu

### 1500 UTC - 11AM EDT / 10AM CDT / 8AM PDT

1500 1510	mtwhfa	Turkmenistan, Turkmen Radio	5015eu
1500 1530		Australia, HCJB	15425as
1500 1530	fs	Germany, Bible Voice Broadcasting	13840as
1500 1530	s	Hungary, Radio Budapest	6025eu 9690eu
1500 1530		Mongolia, Voice of	12015eu
1500 1530		UK, BBC World Service	9695af 11690af
		11940af 15400af 15420af 15485af	
		17640af 17830af 21470af 21660af	
1500 1545		Russia, FEBA	7320as
1500 1545		South Africa, The Voice Africa	9555af
1500 1545		USA, WYFR Okeechobee FL	15770va
1500 1555	mtwhf	Italy, IRRS	13840va
1500 1555		South Africa, Channel Africa	17770af
1500 1557		Canada, Radio Canada Intl	11675as 15360as
		17720as	
1500 1559		South Africa, Channel Africa	9620af
1500 1600		Anguilla, Caribbean Beacon	11775am
1500 1600		Australia, CVC International	13635as
1500 1600		Australia, Radio	5995pa 6080as 7240pa
		9475as 9590pa 9625as 11660as	
1500 1600	DRM	Bulgaria, World Radio Network	11540eu
1500 1600	as	Canada, CBC NQ SW Service	9625na
1500 1600		Canada, CFRX Toronto ON	6070do
1500 1600		Canada, CFVP Calgary AB	6030do
1500 1600		Canada, CKZN St John's NF	6160do
1500 1600		Canada, CKZU Vancouver BC	6160do
1500 1600		China, China Radio Intl	6100af 7160as
		9435eu 9525eu 9785as 11775as	
		13685na 13740af 17630af	
1500 1600		Costa Rica, University Network	9725va
		11870va 13750va	
1500 1600		Germany, Deutsche Welle	6140eu
1500 1600		Germany, The Voice Africa	15715af
1500 1600		Japan, Radio Japan/NHK World	6190as
		7200as 9505va 11730as	
1500 1600		Jordan, Radio	11690na
1500 1600		Libya, Voice of Africa	17850af 21695af
1500 1600		Malaysia, RTM/Trax FM	7295as
1500 1600		Malaysia, Voice of 6175as	
1500 1600		Netherlands, Radio	9345as 9890as
		11835as	
1500 1600		New Zealand, Radio NZ Intl	7145pa
1500 1600		North Korea, Voice of Korea	7570eu 9335na
		11710na 12015eu	

1500 1600	vi	Papua New Guinea, Wantok R.Light	7120va
1500 1600		Russia, Voice of 4965me 4975me 7300eu	
		9660as 12040eu 15455eu	
1500 1600		Singapore, MediaCorp Radio	6150do
1500 1600		UK, BBC World Service	5975as 6195as
		9740as 11750as 12095eu 15310as	
		15485eu 15565eu 17640va 17790as	
1500 1600	vi/ mtwhf	UK, Sudan Radio Service	15575va
1500 1600		USA, Armerican Forces Radio	4319usb 5446usb
		5765usb 6350usb 7590usb 7812usb	
		10320usb 12133usb 12579usb 13362usb	
		13855usb	
1500 1600		USA, KAIJ Dallas TX	13815na
1500 1600		USA, KJES Vado NM	11715na
1500 1600		USA, KTNB Salt Lake City UT	7505na
1500 1600		USA, KWHR Naalehu HI	9930as
1500 1600		USA, Voice of America	4930af 6160va
		7125af 7405va 9590va 12040va	
		12150af 13795va 15105va 15195va	
		15445va 15550af 15580af 17895af	
1500 1600		USA, WBCQ Kennebunk ME	5110na 7415na
		9330na 17495na	
1500 1600		USA, WBOH Newport NC	5920am
1500 1600		USA, WEWN Birmingham AL	9955na
1500 1600		USA, WHRA Greenbush ME	17650na
1500 1600		USA, WHRI Noblesville IN	9840am 11785am
		13760am	
1500 1600		USA, WINB Red Lion PA	13570am
1500 1600		USA, WRMI Miami FL	7385am
1500 1600		USA, WTJC Newport NC	9370na
1500 1600		USA, WWCR Nashville TN	9985na 12160na
		13845na 15825na	
1500 1600		USA, WWRB Manchester TN	9385na 11915na
1500 1600		USA, WYFR Okeechobee FL	6280va 11830va
		11910va 17750va	
1500 1600		Zambia, Christian Voice	4965af
1500 1600	f DRM	Taiwan, Radio Taiwan Intl	9770eu
1505 1520	m	Austria, Radio Austria Intl	13755am
1505 1530	as	Austria, Radio Austria Intl	13775am
1515 1530	twhf	Austria, Radio Austria Intl	13775am
1530 1600	mtwhf	Germany, Bible Voice Broadcasting	13840as
1530 1600		Iran, Voice of the Islamic Rep	7350as 9635as
		11650al	
1530 1600		UAE, AWR Africa	15225as
1530 1600		UK, BBC World Service	6190af 11940af
		15400af 15485af 17640af 17830af	
		21470af 21660af	
1530 1600		Vatican City, Vatican Radio	12065va 13765va
		15235va	
1535 1600	as	Austria, Radio Austria Intl	13775am
1545 1600	mtwhf	Austria, Radio Austria Intl	13775am
1545 1600	s	Germany, Pan American BC	15650me

### 1600 UTC - 12PM EDT / 11AM CDT / 9AM PDT

1600 1640	vi/mtwhf	Moldova, Radio Pridnestrovye	5910eu
1600 1615	f	Armenia, FEBA	9850as
1600 1615		Pakistan, Radio	9375va 11570va 12105va
		15725va	
1600 1615		UK, BBC World Service	3255af 6190af
		12095af 15105af 15400af 15485af	
		17830af 17885af 21470af 21660af	
1600 1627		Czech Rep, Radio Prague	5930eu 17485af
1600 1630	sh	Germany, Pan American BC	15650me
1600 1630		Guam, AWR/KSDA	11640as 11680as
1600 1630		Iran, Voice of the Islamic Rep	7350as 9635as
		11650al	
1600 1630		Myanmar, Radio	9730do
1600 1645		USA, WYFR Okeechobee FL	11830va 11865va
		17750va	
1600 1650		New Zealand, Radio NZ Intl	7145pa
1600 1659	vi/ mtwhf	UK, Sudan Radio Service	15575va
1600 1700		Anguilla, Caribbean Beacon	11775am
1600 1700		Australia, CVC International	13635as
1600 1700		Australia, Radio	5995pa 6080as 7240pa
		9475as 9710pa 11660as 11750as	
1600 1700	DRM	Bulgaria, World Radio Network	11540eu
1600 1700	a	Canada, CBC NQ SW Service	9625na
1600 1700		Canada, CFRX Toronto ON	6070do
1600 1700		Canada, CFVP Calgary AB	6030do
1600 1700		Canada, CKZN St John's NF	6160do
1600 1700		Canada, CKZU Vancouver BC	6160do
1600 1700		China, China Radio Intl	6100af 7255eu
		9435eu 9525eu 9570af 11900af	
1600 1700		Costa Rica, University Network	9750af 11870va
		13750va	
1600 1700		Egypt, Radio Cairo	11740af
1600 1700		Ethiopia, Radio	5990af 7110af 7165af
		9560af 9704af 11800af	
1600 1700		France, Radio France Intl	1170af 11615af
		15160af 15605af 17605af	
1600 1700		Germany, Bible Voice Broadcasting	13590me

1600	1700		Germany, Deutsche Welle	6170as	9485as
			17595as		
1600	1700		Germany, The Voice Africa	15715af	
1600	1700		Italy, IRRS	5785va	
1600	1700	DRM	Japan, Radio Japan/NHK World		9770eu
1600	1700		Jordan, Radio	11690na	
1600	1700		Malaysia, RTM/Trax FM	7295as	
1600	1700		Malaysia, Voice of 6175as		
1600	1700		North Korea, Voice of Korea	9990va	11545va
1600	1700	vl	Papua New Guinea, Wantok R.Light		7120va
1600	1700		Russia, Voice of	6070as	9405as
			11755as	11985af	12055va
			15540me		12115as
1600	1700		South Korea, KBS World Radio		5975va
1600	1700		Taiwan, Radio Taiwan Intl	11550as	
1600	1700		UK, BBC World Service	3915as	5975as
			6195as	7160as	9510as
			12095va	15485eu	15565eu
1600	1700		USA, American Forces Radio	4319usb	5446usb
			5765usb	6350usb	7590usb
			10320usb	12133usb	12579usb
			13855usb		13362usb
1600	1700		USA, KAIJ Dallas TX	13815na	
1600	1700		USA, KJES Vado NM	11715na	
1600	1700		USA, KTBN Salt Lake City UT	15590na	
1600	1700		USA, KWHR Naalehu HI	9930as	
1600	1700		USA, Voice of America	4930af	7405af
			15195va	12080af	13600va
			15445va	15580af	17895af
1600	1700		USA, WBCQ Kennebunk ME	5110na	7415na
			9330na	17495na	18910na
1600	1700		USA, WBOH Newport NC	5920am	
1600	1700		USA, WEWN Birmingham AL	13615na	
1600	1700		USA, WHRA Greenbush ME	17640na	
1600	1700		USA, WHRI Noblesville IN	9840am	13760am
			15285am		
1600	1700		USA, WINB Red Lion PA	13570am	
1600	1700	mtwhfa	USA, WMLK Bethel PA	9265eu	
1600	1700		USA, WRMI Miami FL	9955am	13620as
1600	1700		USA, WTJC Newport NC	9370na	
1600	1700		USA, WWCN Nashville TN	9985na	12160na
			13845na	15825na	
1600	1700		USA, WWRB Manchester TN	9385na	11915na
1600	1700		USA, WYFR Okeechobee FL	6085va	6085va
			13695va	18980va	21455va
1600	1700		Zambia, Christian Voice	4965af	2525va
1615	1630		Vatican City, Vatican Radio	4005eu	5885eu
			7250eu	9645eu	15595va
1615	1700		UK, BBC World Service	3255af	6190af
			12095af	15105af	15485af
			17830af	17885af	21470af
1630	1700	as	UK, BBC World Service	695af	11690af
1630	1700	t	Germany, Bible Voice Broadcasting		13580me
1630	1700	as	Germany, Bible Voice Broadcasting		9430me
1630	1700		Guam, AWR/KSDA	11975as	
1630	1700		Slovakia, Radio Slovakia Intl	5920eu	6055eu
1640	1650	mtwhfa	Turkmenistan, Turkmen Radio	4930eu	
1651	1700		New Zealand, Radio NZ Intl	7145pa	

### 1700 UTC - 1PM EDT / 12PM CDT / 10AM PDT

1700	1725		Vietnam, Voice of	9725eu	
1700	1727		Czech Rep, Radio Prague	5930eu	17485va
1700	1730		France, Radio France Intl	15605af	17605af
1700	1730	mtwhf	Germany, Bible Voice Broadcasting		13580me
1700	1730		Jordan, Radio	11690na	
1700	1730		Swaziland, TWR	3200af	
1700	1745		UK, BBC World Service	3255af	6005af
			6190af	9630af	9740as
			12095va	15105af	15400af
			17830af	17885af	21470af
1700	1755		South Africa, Channel Africa	15235af	
1700	1759		Poland, Radio Polonia	7220eu	7265eu
1700	1800		Anguilla, Caribbean Beacon	11775am	
1700	1800		Australia, CVC International	13635as	
1700	1800		Australia, Radio	5995pa	6080as
			9475as	9580pa	9710pa
1700	1800	DRM	Bulgaria, World Radio Network		11540eu
1700	1800	a	Canada, CBC NQ SW Service	9625na	
1700	1800		Canada, CFRX Toronto ON	6070do	
1700	1800		Canada, CFVP Calgary AB	6030do	
1700	1800		Canada, CKZN St John's NF	6160do	
1700	1800		Canada, CKZU Vancouver BC	6160do	
1700	1800		China, China Radio Intl	6100eu	7255eu
			9570af	11900af	
1700	1800		Costa Rica, University Network		11870va
			13750va		
1700	1800		Egypt, Radio Cairo	11740af	
1700	1800		Germany, The Voice Africa	15715af	
1700	1800		Italy, IRRS	5785va	
1700	1800		Japan, Radio Japan/NHK World		9535va
			11970eu	15355af	

1700	1800		Malaysia, RTM/Trax FM	7295as	
1700	1800		Malaysia, Voice of 6175as		
1700	1800		New Zealand, Radio NZ Intl	7145pa	
1700	1800		Nigeria, Voice of	15120va	
1700	1800	vl	Papua New Guinea, Wantok R.Light		7120va
1700	1800		Russia, Voice of	7300eu	9405as
			11510af	11985af	9890eu
1700	1800	as	Russia, Voice of	9820eu	
1700	1800		Taiwan, Radio Taiwan Intl	11850af	
1700	1800		UK, BBC World Service	3915as	5975as
			6195eu	7160as	9410eu
			11955as	15485va	15565eu
1700	1800	vl/ mtwhf	UK, Sudan Radio Service	11705va	
1700	1800		USA, Armerican Forces Radio	4319usb	5446usb
			5765usb	6350usb	7590usb
			10320usb	12133usb	12579usb
			13855usb		13362usb
1700	1800		USA, KAIJ Dallas TX	13815na	
1700	1800		USA, KTBN Salt Lake City UT	15590na	
1700	1800		USA, KWHR Naalehu HI	9930as	
1700	1800		USA, Voice of America	7405af	15410af
			15580af		
1700	1800		USA, WBCQ Kennebunk ME	5110na	7415na
			9330na	17495na	18910na
1700	1800		USA, WBOH Newport NC	5920am	
1700	1800		USA, WEWN Birmingham AL	13615va	15220va
1700	1800		USA, WHRA Greenbush ME	17640na	
1700	1800		USA, WHRI Noblesville IN	13760am	15285am
			15665am	15785am	
1700	1800		USA, WINB Red Lion PA	13570am	
1700	1800	mtwhfa	USA, WMLK Bethel PA	9265eu	15265eu
1700	1800		USA, WRMI Miami FL	9955am	
1700	1800		USA, WTJC Newport NC	9370na	
1700	1800		USA, WWCN Nashville TN	9985na	12160na
			13845na	15825na	
1700	1800		USA, WWRB Manchester TN	9385na	11915na
			15250na		
1700	1800		USA, WYFR Okeechobee FL	13695va	13695va
			17795va	18980va	21455va
1700	1800		Zambia, Christian Voice	4965af	
1730	1745		Israel, Kol Israel	9345va	11590va
1730	1745	mtwhf	UK, United Nations Radio	7170af	9565me
			17810af		
1730	1759	f	Germany, Bible Voice Broadcasting		13590me
1730	1800		Bulgaria, Radio	9500eu	11500eu
1730	1800		Guam, AWR/KSDA		9385as
1730	1800		Liberia, ELWA	4760do	
1730	1800		Philippines, Radio Pilipinas	11720va	15190va
			17720va		
1730	1800		Swaziland, TWR	3200af	9500af
1730	1800		Sweden, Radio	6065va	
1730	1800		Vatican City, Vatican Radio	11625af	13765af
			15570af		
1745	1800		Bangladesh, Bangla Betar	7185eu	
1745	1800		India, All India Radio	7410eu	9445af
			9950eu	11620eu	11935af
			15075af	15155af	17670af
1745	1800		UK, BBC World Service	3255af	6190af
			11945af	12095af	15105af
			15485af	17830af	17885af
					21470af

### 1800 UTC - 2PM EDT / 1PM CDT / 11AM PDT

1800	1810		Zambia, Christian Voice	11735af	
1800	1830		Austria, AWR Europe	15315af	
1800	1830	as	Germany, Bible Voice Broadcasting		13810va
1800	1830	whf	Germany, Bible Voice Broadcasting		11710me
1800	1830		South Africa, AWR Africa	3215af	3345af
			9600af		
1800	1830		Swaziland, TWR	3200af	9500af
1800	1830		UK, BBC World Service	3255af	5975as
			6190af	9510as	11945af
			15400af		12095af
1800	1830		USA, Voice of America	7405af	11975af
			15410af	15580af	17895af
1800	1830	as	USA, Voice of America	4930af	
1800	1845		USA, WYFR Okeechobee FL	17535va	
1800	1850		New Zealand, Radio NZ Intl	7145pa	
1800	1859	f	Italy, IRRS	9380va	
			Canada, Radio Canada Intl	9530af	11765af
			13730af	15255af	
1800	1900		Anguilla, Caribbean Beacon	11775am	
1800	1900	mtwhf	Argentina, RAE	9690eu	15345eu
1800	1900		Australia, Radio	6080pa	7240pa
			9580pa	9710pa	11880pa
1800	1900	DRM	Bulgaria, World Radio Network		9310eu
1800	1900		Canada, CFRX Toronto ON	6070do	
1800	1900		Canada, CFVP Calgary AB	6030do	
1800	1900		Canada, CKZN St John's NF	6160do	
1800	1900		Canada, CKZU Vancouver BC	6160do	
1800	1900		China, China Radio Intl	6100eu	
1800	1900		Costa Rica, University Network		11870va



1800	1900	as	13750va		
1800	1900		Germany, Bible Voice Broadcasting	9430me	
1800	1900		Germany, The Voice Africa	13820af	
1800	1900		India, All India Radio	7410eu	9445af
			9950eu	11620eu	11935af
			15075af	15155af	17670af
1800	1900		Italy, IRRS	5785va	
1800	1900		Liberia, ELWA	4760do	
1800	1900		Malaysia, RTM/Trax FM	7295as	
1800	1900		Malaysia, Voice of 6175as		
1800	1900		Netherlands, Radio	6020af	7120af
			11655af		
1800	1900		Nigeria, Voice of	15120va	
1800	1900		North Korea, Voice of Korea	7570eu	12015eu
1800	1900	vl	Papua New Guinea, Wantok R.Light	7120va	
1800	1900		Philippines, Radio Pilipinas	11720va	15190va
			17720va		
1800	1900		Romania, Radio Romania Intl	9635eu	11830eu
1800	1900		Russia, Voice of	7300eu	9745af
			9890eu	11510af	11630eu
1800	1900		Taiwan, Radio Taiwan Intl	3965eu	
1800	1900		UK, BBC World Service	6195eu	9410eu
			12095eu		
1800	1900		USA, American Forces Radio	4319usb	5446usb
			5765usb	6350usb	7590usb
			10320usb	12133usb	12579usb
			13855usb		13362usb
1800	1900		USA, KAIJ Dallas TX	13815na	
1800	1900		USA, KTBN Salt Lake City UT	15590na	
1800	1900		USA, WBCQ Kennebunk ME	5110na	7415na
			9330na	17495na	18910na
1800	1900		USA, WBOH Newport NC	5920am	
1800	1900		USA, WEWN Birmingham AL	13615va	15220va
1800	1900		USA, WHRA Greenbush ME	17640na	
1800	1900		USA, WHRI Noblesville IN	13760am	15285am
			15665am	15785am	
1800	1900		USA, WINB Red Lion PA	13570am	
1800	1900	mtwhfa	USA, WMLK Bethel PA	9265eu	15265eu
1800	1900		USA, WRMI Miami FL	9955am	
1800	1900		USA, WTJC Newport NC	9370na	
1800	1900		USA, WWCN Nashville TN	9975na	12160na
			13845na	15825na	
1800	1900		USA, WWRB Manchester TN	9385na	11915na
			15250na		
1800	1900		USA, WYFR Okeechobee FL	13695va	13800va
			17795va	18980va	
1800	1900		Yemen, Rep of Yemen Radio	9780me	
1800	1900		Zambia, Christian Voice	4965af	
1815	1830	mwf	Germany, Bible Voice Broadcasting	6015eu	
1815	1845	h	Germany, Bible Voice Broadcasting	6015eu	
1815	1900		Bangladesh, Bangla Betar	7185as	
1830	1900		Greece, Voice of	7430eu	
1830	1900		Serbia & Montenegro, Intl Radio	6100eu	
1830	1900		Slovakia, Radio Slovakia Intl	5920eu	6055eu
1830	1900		Swaziland, TWR	3200af	
1830	1900		Turkey, Voice of	9785eu	
1830	1900		UK, BBC World Service	3255af	6005af
			6190af	9630af	11945af
			12095af	15400af	17795af
			21470af		17830af
1830	1900		USA, Voice of America	4930af	7405af
			11975af	15410af	15580af
1845	1900	mtwhfa	Albania, Radio Tirana	7465eu	
1845	1900		Congo, RTV Congolaise	4765af	5985af
1851	1900		New Zealand, Radio NZ Intl	9630pa	

### 1900 UTC - 3PM EDT / 2PM CDT / 12PM PDT

1900	1915		Congo, RTV Congolaise	4765af	5985af
1900	1915	a	Germany, Bible Voice Broadcasting	9430me	
1900	1925		Israel, Kol Israel	9400va	11590va
1900	1929	s	Germany, Universal Life	11880me	
1900	1930	s	Germany, Bible Voice Broadcasting	9775af	
1900	1930		Hungary, Radio Budapest	3975eu	6025eu
1900	1930		Philippines, Radio Pilipinas	11720va	15190va
			17720va		
1900	1930		Turkey, Voice of	9785eu	
1900	1945		India, All India Radio	7410eu	9445af
			9950eu	11620eu	11935af
			15075af	15155af	17670af
1900	1945		USA, WYFR Okeechobee FL	6085va	
1900	1950		New Zealand, Radio NZ Intl	9630pa	
1900	1959		Germany, Overcomer Ministries		9860eu
1900	2000		Anguilla, Caribbean Beacon	11775am	
1900	2000		Australia, Radio	6080pa	7240pa
			9580pa	9710pa	11880pa
1900	2000		Belarus, Radio	7105eu	7290eu
1900	2000	DRM	Bulgaria, World Radio Network		9310eu
1900	2000		Canada, CFRX Toronto ON	6070do	
1900	2000		Canada, CFVP Calgary AB	6030do	
1900	2000		Canada, CKZN St John's NF	6160do	
1900	2000		Canada, CKZU Vancouver BC	6160do	

1900	2000		China, China Radio Intl	7295va	9440af
1900	2000		Costa Rica, University Network		11870va
			13750va		
1900	2000		Eqt Guinea, Radio Africa	15190af	
1900	2000		Germany, Deutsche Welle	13780af	15620af
1900	2000		Germany, The Voice Africa	13820af	
1900	2000	vl	Ghana, Ghana BC Corp	3366do	4915do
1900	2000		Italy, IRRS	5785va	
1900	2000	f	Italy, IRRS	5775va	9380va
1900	2000		Liberia, ELWA	4760do	
1900	2000		Malaysia, RTM/Trax FM	7295as	
1900	2000	vl	Namibia, Namibian BC Corp	3270do	3290do
			6060do	6175do	
1900	2000		Netherlands, Radio	5905af	7120af
			11655af	17810af	
1900	2000	as	Netherlands, Radio	15315na	17735na
			17660na		
1900	2000		Nigeria, Radio/Ibadan	6050do	
1900	2000		Nigeria, Radio/Kaduna	4770do	6090do
1900	2000		Nigeria, Radio/Lagos	3326do	4990do
1900	2000		Nigeria, Voice of	15120va	
1900	2000		North Korea, Voice of Korea	7100af	9975va
			11535va	11910af	
1900	2000		Papua New Guinea, Catholic Radio		4960do
1900	2000		Papua New Guinea, NBC	4890do	
1900	2000	vl	Papua New Guinea, Wantok R.Light	7120va	
1900	2000		Russia, Voice of	7380eu	9890eu
1900	2000	irreg/ vl	Sierra Leone, SLBS3316do		
1900	2000	vl	Solomon Islands, SIBC	5020do	9545do
1900	2000	m	South Africa, Radio League	3215af	
1900	2000		South Korea, KBS World Radio		5975va
			7275eu		
1900	2000	a	Sri Lanka, SLBC	6010eu	
1900	2000		Swaziland, TWR	3200af	
1900	2000		Thailand, Radio	7155eu	
1900	2000	vl	Uganda, Radio	4976do	5026do
1900	2000		UK, BBC World Service	3255af	6005af
			6190af	6195eu	9410eu
			12045me	12095af	15400af
			17830af		17795af
1900	2000		USA, American Forces Radio	4319usb	5446usb
			5765usb	6350usb	7590usb
			10320usb	12133usb	12579usb
			13855usb		13362usb
1900	2000		USA, KAIJ Dallas TX	13815na	
1900	2000		USA, KJES Vado NM	15385na	
1900	2000		USA, KTBN Salt Lake City UT	15590na	
1900	2000		USA, Voice of America	4930af	4940af
			6040me	7405af	9670me
			15410af	15445af	15580af
1900	2000		USA, WBCQ Kennebunk ME	5110na	7415na
			9330na	17495na	18910na
1900	2000		USA, WBOH Newport NC	5920am	
1900	2000		USA, WEWN Birmingham AL	13615va	15220va
1900	2000		USA, WHRA Greenbush ME	13710na	
1900	2000		USA, WHRI Noblesville IN	13760am	15285am
			15665am	15785am	
1900	2000		USA, WINB Red Lion PA	13570am	
1900	2000	mtwhfa	USA, WMLK Bethel PA	9265eu	15265eu
1900	2000		USA, WRMI Miami FL	9955am	
1900	2000		USA, WTJC Newport NC	9370na	
1900	2000		USA, WWCN Nashville TN	9975na	12160na
			13845na	15825na	
1900	2000		USA, WWRB Manchester TN	9385na	11915na
			15250na		
1900	2000		USA, WYFR Okeechobee FL	3230va	13695va
			13800va	17795va	17845va
			18980va		18930va
1900	2000		Zambia, Christian Voice	4965af	
1900	2000	vl	Zimbabwe, ZBC Corp	5975do	
1910	1930		Armenia, Public Radio of	4810eu	9960eu
1930	2000	mtwhfa	Albania, Radio Tirana	9920eu	
1930	2000	s	Germany, Bible Voice Broadcasting	9775af	
1930	2000	s	Germany, Pan American BC	9430me	
1930	2000		Iran, Voice of the Islamic Rep	6205eu	7205eu
			9800af	9925af	11860af
1930	2000		Sweden, Radio	6065va	
1935	1955		Italy, RAI Intl	5960eu	9485eu
1945	2000	vl	Rwanda, Radio	6055do	
1950	2000		Vatican City, Vatican Radio	4005eu	5885eu
			7250eu	9645eu	
1951	2000		New Zealand, Radio NZ Intl	11725pa	

### 2000 UTC - 4PM EDT / 3PM CDT / 1PM PDT

2000	2015	f	Germany, Pan American BC	9430me	
2000	2020		Vatican City, Vatican Radio	4005eu	5885eu
			7250eu	9645eu	
2000	2027		Czech Rep, Radio Prague	5930va	11600va
2000	2030	h	Germany, Bible Voice Broadcasting	9605va	
2000	2030	as	Germany, Pan American BC	9430me	
2000	2030		Iran, Voice of the Islamic Rep	6205eu	7205eu

2000	2030		9800af	9925af	11860al	
2000	2030		Mongolia, Voice of	12015eu		
2000	2030		South Africa, AWR Africa		7180af	
2000	2030		Swaziland, TWR	3200af		
2000	2030		USA, Voice of America		4940af	4940af
			7405af	11975af	15410af	15445af
			15580af			
2000	2030	a	USA, WRMI Miami FL		9405af	
2000	2030		Vatican City, Vatican Radio		9755af	11625af
			13765af			
2000	2045		USA, WYFR Okeechobee FL		17750va	
2000	2050		New Zealand, Radio NZ Intl		11725pa	
2000	2059		Canada, Radio Canada Intl		5850eu	7235eu
			11765eu	15325eu		
2000	2059	mtwhf	Spain, Radio Exterior Espana		9595af	15290eu
2000	2100		Anguilla, Caribbean Beacon		11775am	
2000	2100		Australia, ABC NT Alice Springs			2310do
			4835irr			
2000	2100		Australia, ABC NT Katherine		2485do	
2000	2100		Australia, ABC NT Tennant Creek			2325do
2000	2100		Australia, Radio	9500as	11650pa	11660pa
			11880pa	12080pa		
2000	2100	as	Australia, Radio	6080pa	7240pa	
2000	2100		Belarus, Radio	7105eu	7290eu	
2000	2100	DRM	Bulgaria, World Radio Network			9310eu
2000	2100		Canada, CFRX Toronto ON		6070do	
2000	2100		Canada, CFVP Calgary AB		6030do	
2000	2100		Canada, CKZN St John's NF		6160do	
2000	2100		Canada, CKZU Vancouver BC		6160do	
2000	2100		Canada, Radio Canada Intl		17765am	
2000	2100		China, China Radio Intl		5960eu	7190eu
			7285eu	7295va	9440va	9490eu
			9600eu	11640af	13630af	
2000	2100		Costa Rica, University Network			13750va
2000	2100		Egypt, Radio Cairo	15375af		
2000	2100		Eqt Guinea, Radio Africa		15190af	
2000	2100		Germany, Deutsche Welle		7130af	11795af
			13780af	15205af		
2000	2100		Germany, The Voice Africa		9765af	
2000	2100	vl	Ghana, Ghana BC Corp		3366do	4915do
2000	2100		Indonesia, Voice of		9525as	11785pa
			15150al			
2000	2100		Italy, IRRS	5775va	5785va	
2000	2100		Liberia, ELWA	4760do		
2000	2100		Malaysia, RTM/Trax FM		7295as	
2000	2100	vl	Namibia, Namibian BC Corp		3270do	3290do
			6060do	6175do		
2000	2100	as	Netherlands, Radio		15315af	17735na
			17660af			
2000	2100		Netherlands, Radio		5905af	7120af
			11665af	17810af		
2000	2100		Nigeria, Radio/Ibadan		6050do	
2000	2100		Nigeria, Radio/Kaduna		4770do	6090do
2000	2100		Nigeria, Radio/Lagos		3326do	4990do
2000	2100		Nigeria, Voice of	15120va		
2000	2100		Papua New Guinea, Catholic Radio		4960do	
2000	2100		Papua New Guinea, NBC		4890do	
2000	2100	vl	Papua New Guinea, Wantok R.Light		7120va	
2000	2100		Russia, Voice of	9890eu	12070eu	15455eu
			15735sa			
2000	2100	vl	Solomon Islands, SIBC		5020do	9545do
2000	2100		South Africa, Channel Africa		3345af	
2000	2100	vl	Uganda, Radio	4976do	5026do	7196do
2000	2100		UK, BBC World Service		3255af	6005af
			6190af	6195eu	9410eu	9630af
			12095af	15400af	17830af	
2000	2100		USA, Armerican Forces Radio		4319usb	5446usb
			5765usb	6350usb	7590usb	7812usb
			10320usb	12133usb	12579usb	13362usb
			13855usb			
2000	2100		USA, KAIJ Dallas TX		13815na	
2000	2100		USA, KJES Vado NM		15385na	
2000	2100		USA, KTBN Salt Lake City UT		15590na	
2000	2100		USA, WBCQ Kennebunk ME		5110na	7415na
			9330na	17495na	18910na	
2000	2100		USA, WBOH Newport NC		5920am	
2000	2100		USA, WEWN Birmingham AL		13615va	15220va
2000	2100		USA, WHRA Greenbush ME		13710na	
2000	2100		USA, WHRI Noblesville IN		13760am	15285am
			15665am	15785am		
2000	2100		USA, WINB Red Lion PA		13570am	
2000	2100	mtwhfa	USA, WMLK Bethel PA		9265eu	15265eu
2000	2100		USA, WRMI Miami FL		9955am	
2000	2100		USA, WTJC Newport NC		9370na	
2000	2100		USA, WWCR Nashville TN		9975na	12160na
			13845na	15825na		
2000	2100		USA, WWRB Manchester TN		9385na	11915na
			15250na			
2000	2100		USA, WYFR Okeechobee FL		3230va	13800va
			17725va	17795va	17845va	18980va
2000	2100		Zambia, Christian Voice		4965af	
2000	2100	vl	Zimbabwe, ZBC Corp		5975do	
2000	2130		China, China Radio Intl		11640af	13630af

2005	2100		Syria, Radio Damascus		9330eu	12085eu
			13610al			
2025	2045		Italy, RAI Intl	6010af	11875af	
2030	2045		Thailand, Radio	9680eu		
2030	2100		Cuba, Radio Havana		9505va	11760va
2030	2100		Turkey, Voice of	7170as		
2030	2100		USA, Voice of America		4930af	7555as
			11975af	15410af	15445af	15580af
2030	2100	as	USA, Voice of America		4940af	
2045	2100		India, All India Radio		7410eu	9445eu
			9910oc	9950eu	11620va	11715oc
2051	2100		New Zealand, Radio NZ Intl		15720pa	

## 2100 UTC - 5PM EDT / 4PM CDT / 2PM PDT

2100	2130		Australia, ABC NT Katherine		2485do	
2100	2130		Australia, ABC NT Tennant Creek			2325do
2100	2130		Australia, Radio	9500as	11695as	
2100	2130		Austria, AWR Europe		11955af	
2100	2130	a	Canada, CBC NQ SW Service		9625na	
2100	2130		Cuba, Radio Havana		9505va	11760va
2100	2130		Egypt, Radio Cairo	15375af		
2100	2130		Hungary, Radio Budapest		6025eu	9525eu
2100	2130		South Korea, KBS World Radio			3955eu
2100	2130		Turkey, Voice of	7179as		
2100	2130		UK, BBC World Service		11675va	15390va
2100	2145		Nigeria, Radio/Ibadan		6050do	
2100	2145		USA, WYFR Okeechobee FL		13800va	17795va
			18980va			
2100	2159		Canada, Radio Canada Intl		17765af	
2100	2159	as	Spain, Radio Exterior Espana		9595af	9840eu
2100	2200		Anguilla, Caribbean Beacon		11775am	
2100	2200		Australia, ABC NT Alice Springs			2310do
			4835irr			
2100	2200		Australia, Radio	9660pa	7240pa	11650pa
			11660pa	12080pa	13630pa	15515pa
2100	2200		Belarus, Radio	7105eu	7290eu	
2100	2200		Bulgaria, Radio	5800eu	7500eu	
2100	2200		Canada, CFRX Toronto ON		6070do	
2100	2200		Canada, CFVP Calgary AB		6030do	
2100	2200		Canada, CKZN St John's NF		6160do	
2100	2200		Canada, CKZU Vancouver BC		6160do	
2100	2200		Canada, Radio Canada Intl		9800na	
2100	2200		China, China Radio Intl		5960eu	7235eu
			9490eu	9600eu		
2100	2200		Costa Rica, University Network			13750va
2100	2200		Eqt Guinea, Radio Africa		15190af	
2100	2200		Germany, Deutsche Welle		9440af	11865af
			15205af			
2100	2200	vl	Ghana, Ghana BC Corp		3366do	4915do
2100	2200		Guyana, Voice of	3291do	9590do	
2100	2200		India, All India Radio		9910oc	11620oc
			11715oc			
2100	2200	mtwh	Italy, IRRS	5775va		
2100	2200		Japan, Radio Japan/NHK World		6035oc	
			6055eu	6180eu	11855af	17825va
			21670pa			
2100	2200		Liberia, ELWA	4760do		
2100	2200		Liberia, Star Radio	11960af		
2100	2200		Malaysia, RTM/Trax FM		7295as	
2100	2200	vl	Namibia, Namibian BC Corp		3270do	3290do
			6060do	6175do		
2100	2200		New Zealand, Radio NZ Intl		15720pa	
2100	2200		Nigeria, Radio/Kaduna		4770do	6090do
2100	2200		Nigeria, Radio/Lagos		3326do	4990do
2100	2200		North Korea, Voice of Korea		7570eu	12015eu
2100	2200		Papua New Guinea, Catholic Radio		4960do	
2100	2200		Papua New Guinea, NBC		4890do	
2100	2200	vl	Papua New Guinea, Wantok R.Light		7120va	
2100	2200		Russia, Voice of	15735sa		
2100	2200	vl	Rwanda, Radio	6055do		
2100	2200	irreg/ vl	Sierra Leone, SLBS3316do			
2100	2200		South Africa, Channel Africa		3345af	
2100	2200		Syria, Radio Damascus		9330eu	12085eu
			13610al			
2100	2200		UK, BBC World Service		3255af	3915as
			5965as	6005af	6190af	6195as
			11945as	12095af	15400af	
2100	2200		Ukraine, Radio Ukraine Intl		5830eu	
2100	2200		USA, Armerican Forces Radio		4319usb	5446usb
			5765usb	6350usb	7590usb	7812usb
			10320usb	12133usb	12579usb	13362usb
			13855usb			
2100	2200		USA, KAIJ Dallas TX		13815na	
2100	2200		USA, KTBN Salt Lake City UT		15590na	
2100	2200		USA, Voice of America		7555as	
2100	2200		USA, WBCQ Kennebunk ME		5110na	7415na
			9330na	17495na	18910na	
2100	2200		USA, WBOH Newport NC		5920am	
2100	2200		USA, WEWN Birmingham AL		13615va	15220va
2100	2200		USA, WHRA Greenbush ME		11610na	11765na
2100	2200		USA, WHRI Noblesville IN		13760am	15285am

		15665am	15785am		
2100	2200	USA, WINB Red Lion PA	13570am		
2100	2200	USA, WMLK Bethel PA	15265eu		
2100	2200	USA, WRMI Miami FL	7385am		
2100	2200	USA, WTJC Newport NC	9370na		
2100	2200	USA, WWCN Nashville TN	9975na	12160na	
		13845na	15825na		
2100	2200	USA, WWRB Manchester TN	9385na	11915na	
		15250na			
2100	2200	USA, WYFR Okeechobee FL	6045va	11565va	
		17725va	17845va		
2100	2200	Zambia, Christian Voice	4965af		
2100	2200	vi Zimbabwe, ZBC Corp	5975do		
2115	2200	Egypt, Radio Cairo 9990eu			
2130	2157	Czech Rep, Radio Prague	9410na	11600af	
2130	2200	Albania, Radio Tirana	7465eu		
2130	2200	Australia, ABC NT Katherine	5025do		
2130	2200	Australia, ABC NT Tennant Creek		4910do	
2130	2200	Canada, CBC NQ SW Service	9625na		
2130	2200	Guam, AWR/KSDA	11850as		
2130	2200	Romania, Radio Romania Intl	7210va	9535va	
		11940va	15465va		
2130	2200	Sweden, Radio	6065va	7420va	
2130	2200	UK, BBC World Service	15390va		

## 2200 UTC - 6PM EDT / 5PM CDT / 3PM PDT

2200	2210	Syria, Radio Damascus	9330eu	12085eu	
2200	2230	India, All India Radio	9910oc	11620oc	
		11715oc	9950eu	11620va	11715oc
2200	2230	Papua New Guinea, NBC	9675do		
2200	2245	Egypt, Radio Cairo 9990eu			
2200	2245	USA, WYFR Okeechobee FL	15770va		
2200	2259	Canada, Radio Canada Intl	6100na		
2200	2300	Anguilla, Caribbean Beacon	6090am		
2200	2300	Australia, ABC NT Alice Springs		2310do	
		4835irr			
2200	2300	Australia, ABC NT Katherine	5025do		
2200	2300	Australia, ABC NT Tennant Creek		4910do	
2200	2300	Australia, Radio	12010va	13620as	
		15230pa	15240as	15515pa	17785pa
		17795pa			
2200	2300	smtwhf Canada, CBC NQ SW Service	9625na		
2200	2300	Canada, CFRX Toronto ON	6070do		
2200	2300	Canada, CFVP Calgary AB	6030do		
2200	2300	Canada, CKZN St John's NF	6160do		
2200	2300	Canada, CKZU Vancouver BC	6160do		
2200	2300	China, China Radio Intl	7170eu		
2200	2300	Costa Rica, University Network		13750va	
2200	2300	Eqt Guinea, Radio Africa	15190af		
2200	2300	Germany, Deutsche Welle	7115as		
2200	2300	DRM Germany, Deutsche Welle	9800va		
2200	2300	vi Ghana, Ghana BC Corp	3366do	4915do	
2200	2300	Guyana, Voice of	3291do		
2200	2300	Italy, IRRS	5775va		
2200	2300	Malaysia, RTM/Trax FM	7295as		
2200	2300	vi Namibia, Namibian BC Corp	3270do	3290do	
		6060do	6175do		
2200	2300	New Zealand, Radio NZ Intl	15720pa		
2200	2300	Nigeria, Radio/Ibadan	6050do		
2200	2300	Nigeria, Radio/Kaduna	4770do	6090do	
2200	2300	Nigeria, Radio/Lagos	3326do	4990do	
2200	2300	Papua New Guinea, Catholic Radio		4960do	
2200	2300	vi Papua New Guinea, Wantok R.Light		7120va	
2200	2300	Sierra Leone, SLBS3316do			
2200	2300	irreg/vl Solomon Islands, SIBC	5020do	9545do	
2200	2300	Taiwan, Radio Taiwan Intl	9355eu		
2200	2300	Turkey, Voice of	9830eu		
2200	2300	UK, BBC World Service	5955af	5965as	
		5975va	6195as	7105as	9740as
		12095af	15400af		
2200	2300	USA, American Forces Radio	4319usb	5446usb	
		5765usb	6350usb	7590usb	7812usb
		10320usb	12133usb	12579usb	13362usb
		13855usb			
2200	2300	USA, KAIJ Dallas TX	13815na		
2200	2300	USA, KTBN Salt Lake City UT	15590na		
2200	2300	USA, Voice of America	7215va	7555as	
		15185va	15290va	17740va	
2200	2300	USA, WBCQ Kennebunk ME	5110na	7415na	
		9330na	17495na	18910na	
2200	2300	USA, WBOH Newport NC	5920am		
2200	2300	USA, WEWN Birmingham AL	9975va	15745va	
2200	2300	USA, WHRA Greenbush ME	11610na	11765na	
2200	2300	m USA, WHRI Noblesville IN	7490am		
2200	2300	USA, WHRI Noblesville IN	9840am	13760am	
		15285am			
2200	2300	USA, WINB Red Lion PA	9265am		
2200	2300	mtwhf USA, WRMI Miami FL	7385am		
2200	2300	as USA, WRMI Miami FL	9955am		
2200	2300	USA, WTJC Newport NC	9370na		
2200	2300	USA, WWCN Nashville TN	5070na	7465na	

		9985na	13845na		
2200	2300	USA, WWRB Manchester TN	9385na	11915na	
		15250na			
2200	2300	USA, WYFR Okeechobee FL	11740va		
2200	2300	Zambia, Christian Voice	4965af		
2205	2230	Italy, RAI Intl	11895as		
2230	2257	Czech Rep, Radio Prague	7345na	9415af	
2230	2300	Guam, AWR/KSDA	15320as		
2230	2300	USA, Voice of America	9570va	13755va	
		15145va			
2245	2300	India, All India Radio	9705as	9950as	
		11620as	11645as	13605as	

## 2300 UTC - 7PM EDT / 6PM CDT / 4PM PDT

2300	0000	Anguilla, Caribbean Beacon	6090am		
2300	0000	Australia, ABC NT Alice Springs		2310do	
		4835irr			
2300	0000	Australia, ABC NT Katherine	5025do		
2300	0000	Australia, ABC NT Tennant Creek		4910do	
2300	0000	Australia, Radio	9660pa	12010va	12080pa
		13620as	13630pa	13670va	15230pa
		17785pa	17795pa	21740pa	
2300	0000	Bulgaria, Radio	9700na		
2300	0000	smtwhf Canada, CBC NQ SW Service	9625na		
2300	0000	Canada, CFRX Toronto ON	6070do		
2300	0000	Canada, CFVP Calgary AB	6030do		
2300	0000	Canada, CKZN St John's NF	6160do		
2300	0000	Canada, CKZU Vancouver BC	6160do		
2300	0000	China, China Radio Intl	5915as	5990am	
		6145na	7180as	11970na	
2300	0000	Costa Rica, University Network		9725va	
2300	0000	Cuba, Radio Havana	9550am		
2300	0000	Egypt, Radio Cairo 11885na			
2300	0000	Germany, Deutsche Welle	5955as	9890as	
		15135as	17860as		
2300	0000	vi Ghana, Ghana BC Corp	3366do	4915do	
2300	0000	Guyana, Voice of	3291do		
2300	0000	India, All India Radio	9705as	9950as	
		11620as	11645as	13605as	
2300	0000	Malaysia, RTM/Trax FM	7295as		
2300	0000	vi Namibia, Namibian BC Corp	3270do	3290do	
		6060do	6175do		
2300	0000	New Zealand, Radio NZ Intl	15720pa		
2300	0000	Papua New Guinea, Catholic Radio		4960do	
2300	0000	Papua New Guinea, NBC	9675do		
2300	0000	vi Papua New Guinea, Wantok R.Light		7120va	
2300	0000	Romania, Radio Romania Intl	6140va	7265va	
		9645va	11940va		
2300	0000	irreg/vl Sierra Leone, SLBS3316do			
2300	0000	Singapore, MediaCorp Radio	6150do		
2300	0000	vi Solomon Islands, SIBC	5020do	9545do	
2300	0000	UK, BBC World Service	3915as	5965as	
		6195as	9580as	9740as	11850as
		11945as	11955as		
2300	0000	USA, American Forces Radio	4319usb	5446usb	
		5765usb	6350usb	7590usb	7812usb
		10320usb	12133usb	12579usb	13362usb
		13855usb			
2300	0000	USA, KAIJ Dallas TX	13815na		
2300	0000	USA, KTBN Salt Lake City UT	15590na		
2300	0000	USA, Voice of America	7215va	7555as	
		15185va	17740va		
2300	0000	USA, WBCQ Kennebunk ME	5110na	7415na	
		9330na	17495na	18910na	
2300	0000	USA, WBOH Newport NC	5920am		
2300	0000	USA, WEWN Birmingham AL	9975va	15745va	
2300	0000	USA, WHRA Greenbush ME	11610na	11765na	
2300	0000	m USA, WHRI Noblesville IN	7490am		
2300	0000	USA, WHRI Noblesville IN	9840am	13760am	
		15285am			
2300	0000	USA, WINB Red Lion PA	9265am		
2300	0000	mtwhf USA, WRMI Miami FL	7385am		
2300	0000	as USA, WRMI Miami FL	9955am		
2300	0000	USA, WTJC Newport NC	9370na		
2300	0000	USA, WWCN Nashville TN	5070na	7465na	
		9985na	13845na		
2300	0000	USA, WWRB Manchester TN	6890na		
2300	0000	USA, WYFR Okeechobee FL	15255am	17750am	
2300	2315	Nigeria, Radio/Kaduna	4770do	6090do	
2300	2315	Nigeria, Radio/Lagos	3326do		
2300	2330	Australia, Radio	15240as		
2300	2330	USA, Voice of America	9570va	13755va	
		15145va			
2300	2345	USA, WYFR Okeechobee FL	11740va		
2300	2345	Vatican City, Vatican Radio	9750na		
2315	2330	Croatia, Croatian Radio	9925sa		
2330	0000	Australia, Radio	15415as	17750as	
2330	0000	Burma, Dem Voice of Burma	5955eu		
2330	0000	Lithuania, Radio Vilnius	9875na		
2330	0000	USA, Voice of America	7260va	9570va	
		13725va	13755va	15145va	



## The Military Weather Channel

**W**hen the weather turns nasty, who do the military pilots turn to for meteorological information? How does a military pilot file a weather report while airborne?

They will talk with ground stations on the "Military Weather Channels," the Pilot to Metro Service (PMSV).

PMSV stations are used to relay meteorological information between airfield weather offices and aircraft pilots. Military weather units operate PMSV stations at selected Air Force, Army, and Navy airfields to provide aircrews a direct contact with weather forecasters or observers. The primary purpose of PMSV is for communicating various types of weather information to pilots and to receive pilot weather reports (PIREPS) of significant or hazardous weather phenomena, which are entered into weather telecommunications networks for dissemination.

PMSV facilities manned by forecasters are listed as "Full Service" while PMSV facilities manned by weather observers are listed as "Limited Service." When an observer responds to a call, they will identify themselves as an observer, state that no forecaster is available, and relay only surface observations, radar observations, terminal forecasts and military weather advisories. If additional forecast information is necessary, the observer will refer the aircrew to a full service PMSV facility where a forecaster is on duty. The radio call for PMSV stations is "METRO," (e.g., Travis METRO).

The Pilot Report (PIREP) is the most common transmission heard by monitors from military aircraft on PMSV frequencies. The PIREP is an aircrew report of weather conditions at altitude. PIREPs are extremely important to operations. Airborne crews can see a broader horizon and experience phenomena which may be hidden from the weather observer's ground view point. For example, cloud bases and tops, turbulence and icing may only be evident to airborne crew. While ground observations contain valuable information, they may not meet the need for information on weather conditions at altitude. Weather technicians use PIREPs to service other aircrews and to aid forecasting. PIREPs are transmitted over selected navigational aids and weather data nets. Air traffic controllers will relay PIREPs to other affected aircrews and weather technicians.

The PIREP format includes a "message type" (UUA: severe; UA: regular) and text element indicators preceding data groups. UUA messages are issued for:

- A. Hail (GR or GS)
- B. Low-Level Wind Shear (LLWS)
- C. Severe icing
- D. Severe or extreme turbulence, including Clear Air Turbulence (CAT)
- E. Tornado, funnel cloud, or waterspout (FC).
- F. Volcanic Eruption and/or Ash (VA), in the air or on the ground.
- G. Any condition that, in the judgment of the person entering the PIREP into the system, would present an extreme hazard to flight.

PIREP message indicators consist of a slash (/), two letters, and a space (except for "FL" which is not followed by a space. Aircraft position is relative to an omni-range transmitter TACAN, VORTAC, /VOR) with a six digit group giving the relative bearing (first three digits) and distance (last three digits) from the omni-range. "DURGC" (during climb) or "DURGD" (during descent) indicates PIREPS received by aircraft taking-off or landing.

Table one lists the indicators used in a

**Table One: PIREP Indicators**

/OV	Indicates aircraft position, time of observation, and altitude
/TM	Time of observation (Zulu)
/FL	Altitude (flight level)
/TP	Type of aircraft
/SK	Sky cover
/WX	Visibility and weather (visibility to nearest mile)
/TA	Temperature (Celsius)
/WV	Wind direction and speed (six digits)
/TB	Turbulence (includes intensity, type, and altitude)
/IC	Icing (includes intensity, type, and altitude)
/RM	Remarks clarifying coded elements and adds significant data

PIREP.

The message that follows is an example of a regular PIREP passed from a pilot to the metro station:

BLV UA/OV BLV 315045/TM 2224/FL UNKN/TP C9/RM BKN LN TSTMS N-S OCNL LTGCCG 030 UNKN 345

Here is our example above decoded in plain language:

Regular PIREP from 315 degrees and 45 miles from Scott AFB, 2224Z, at an unknown flight level. Aircraft is a C-9, observed a broken line of thunderstorms aligned north to south with occasional

lightning from cloud to cloud and from cloud to ground. Cloud bases are at 3,000 ft, unknown total sky cover and cloud tops at 34,500 ft.

### ❖ Forecaster to Aircraft Traffic

In addition to passing weather and forecast conditions for airports requested by military aircrews, the PMSV stations also pass along Severe Weather Forecast Alerts (AWW), Convective SIGMETs, and Airmen's Meteorological Information (AIRMET) to aircrews they communicate with.

The AWW is a preliminary message used to alert airmen that a Severe Weather Bulletin (WW) is being issued. AWW defines an area of possible severe thunderstorms or tornado activity.

The Convective SIGMETs (WST) are issued by time and region, and are associated with thunderstorms. WSTs are issued hourly as required. They are valid for two hours or until superseded. Bulletins consist of an observation and/or a forecast. WSTs cover one of three areas: Eastern (E), Central (C), and Western (W), defined by longitudinal boundaries of 87 and 107 degrees West. Hourly, an Outlook is issued for each region. The Outlook is a 2-6 hour projected thunderstorm activity discussion listed at the end of the WST and is updated as required. WSTs are issued for:

1. Severe thunderstorm with surface winds greater than or equal to 50 knots
2. Hail greater than or equal to 3/4 inches in diameter
3. Tornadoes
4. Embedded thunderstorms
5. A line of thunderstorms
6. Thunderstorms greater than or equal to VIP 4 affecting 40 percent or more of a 3,000 square mile area

AIRMETs are issued only to amend the area forecast concerning weather phenomena which are of operational interest to all aircraft and potentially hazardous to aircraft having limited capability because of lack of equipment, instrumentation, or pilot qualification. AIRMETs concern weather of less severity than that covered by SIGMETs or convective SIGMETs. AIRMETs must affect at least a 3,000 square mile area.

### ❖ Radio Equipment and Decoding the Lingo

The radio transceivers used for PMSV are

set to operate only on their assigned frequency. Normally only the amplifier unit with an audio speaker and an attached push-to-talk microphone is located within the weather office. The actual transmitter, receiver and antenna assemblies are usually located in the base operations radio transmitter room. The amplifier within the weather office is left in the "on" position whenever the station is open.

Pilots do not routinely monitor the transmission frequency, but rather tune to the frequency only when they wish to talk to a forecaster or an observer. The only way the weather forecaster can initiate contact with an aircraft is to have an Air Traffic Controller direct the aircraft to tune to their "Metro" frequency and contact the office. This, however, is rarely done.

When talking to aircraft on the PMSV radio, military radio protocol is used at all times. The military personnel involved in these communications will use prowords, when applicable. Prowords are pronounceable words or phrases that have been assigned specific meanings in order to expedite voice message traffic. Table two contains prowords frequently used in PMSV conversations and their meanings.

Proper military radio procedures are discussed in detail in Allied Communication Publication (ACP) 125, *Communication Instructions Radiotelephone Procedures*. You can download an adobe Acrobat version of this DoD reference publication at <http://www.jcs.mil/j6/cceb/acps/acp125f.pdf>.

**Table Two: Frequently Used PMSV Radio-telephone Prowords and Meanings**

Acknowledge .....	An instruction to the receiver that the transmission must be acknowledged.
All After .....	Reference all of a transmission after the word or phrase given.
Correct .....	What you have transmitted is correct.
Correction.....	I have made an error and the correct information follows.
Figures.....	Numerals or numbers follow.
I Spell .....	The next word will be spelled out phonetically.
Out.....	This is the end of the transmission, no reply is expected.
Over .....	This is the end of my transmission at this time, your reply is necessary.
Roger .....	I have received your transmission satisfactorily.
Say Again .....	Repeat the last transmission.
This is .....	This transmission is from the station whose call sign immediately follows.
Time .....	That which immediately follows is the date-time group of the message.
Wait.....	I must pause for a few seconds.
Wait, Out.....	I must pause longer than a few seconds and will recontact you by call sign.
Wilco .....	I have received your signal, understand it, and will comply. Since the meaning of "Roger" is included in that of "Wilco," the two prowords are never used together.
Wrong .....	Your last transmission is incorrect; the correct version follows.

## ❖ PMSV Frequencies

The frequencies used by PMSV stations are slowly being changed. In years past, monitors found the bulk of the PMSV/Metro station activity on 239.800, 344.600 and 375.200 MHz. But thanks to the new 380-400 MHz Land Mobile subband, Metro station frequencies are on the move. While 239.800 MHz will remain a nationwide allocation, stations on the main frequency of 344.600 MHz are being moved to other frequencies. As our table three shows, 375.200 MHz, another nationwide frequency, only has two stations left on it and these stations will probably change frequency in the near future.

Our Metro list shows you where to tune in PMSV comms no matter where you are located. If you are using an outdoor antenna and one of the bases on our list is within 200-250 miles from your location, plug in those frequencies. You may not be able to hear the ground station, but you should be able to monitor aircraft communicating with these ground stations.

And that does it for this month in the Milcom world. Until next month, 73 and good hunting.

**Table Three: Pilot to Metro Service Frequencies (Worldwide)**

140.300	Various airfields in Germany	309.900	Manas, Kyrgyzstan
227.400	Offutt AFB, NE	312.400	Meridian NAS (McCain Field), MS
228.450	Buckley AFB, CO	313.450	Ali Base (Tallil AB), Iraq
234.800	Fairchild AFB, WA	316.950	Whiting Field NAS North/Whiting Field NAS South, FL
239.800	Little Rock AFB, AR; Davis Monthan AFB, AZ; Beale AFB, CA; Los Alamitos Joint Forces Training Base/Los Alamitos AAF, CA; March ARB, CA; Scott AFB/MidAmerica Airport, IL; Malmstrom AFB/AFHP, MT; Joint Base McGuire-Dix-Lakehurst, NJ; Altus AFB, OK; Lackland AFB (Kelly Field Annex), TX; Randolph AFB, TX; Fort Eustis/Felker AAF, VA; Langley AFB, VA	317.000	Lemoore NAS (Reeves Field), CA
244.325	Al Asad AB, Iraq	318.650	Homestead ARB, FL
244.775	New River MCAS, NC	323.900	Creech AFB (Indian Springs AF Auxillary Field)/Nellis AFB, NV
257.750	Lakenheath RAF, UK; Aviano AB, Italy; Incirlik AB, Turkey	323.925	Seymour Johnson AFB, NC
258.925	Tuzla, Bosnia-Herzegovina	327.400	Fallon NAS, NV
259.900	King Abdulaziz AB, Saudi Arabia	338.000	Riyadh AB, Saudi Arabia
261.025	Tinker AFB, OK	340.600	Coronel Enrique Soto Cano (Palmerola AB), Honduras
263.450	Moody AFB, GA	341.000	Capodichino, Italy
264.000	Brunswick NAS, ME	342.000	Dover AFB, DE
264.500	Beaufort MCAS (Merritt Field), SC	342.300	Maxwell AFB, AL; Kirtland AFB (Albuquerque Intl Sunport), NM; Hill AFB, UT
265.600	Camp Mackall/Mackall AAF, NC; Fort Bragg/Simmons AAF, NC; New Orleans NAS/JRB (Alvin Callender Field), LA	342.350	North Island NAS, CA
267.400	Luke AFB, AZ	342.400	Camp Pendleton/Pendleton MCAS, CA; Edwards AFB, CA; Miramar MCAS, CA; Vandenberg AFB, CA
269.200	Travis AFB, CA	342.500	Fort Wainwright/Wainwright AAF, AK; Eglin AFB, FL; Mountain Home AFB, ID; Fort Polk Joint Readiness Training Center/Polk AAF, LA; Selfridge ANGB, MI; Minot AFB, ND; McEntire ANG, SC; Shaw AFB, SC; McChord AFB, WA
271.600	Fort Eustis/Felker AAF, VA; Norfolk NB/NAS (Chambers Field), VA	342.550	Vance AFB, OK; Fort Worth NAS/JRB, TX
274.750	Dobbins JARB/Atlanta NAS, GA; Westover ARB/Metropolitan Airport, MA	343.150	China Lake NAWS, CA
284.425	Europe - Lajes AB, Azores; Fairford RAF, UK; Mildenhall RAF, UK; Ramstein AB, Germany; Spangdahlem AB, Germany; Moron AB, Spain	343.200	Fort Benning/Lawson AAF, GA
289.950	Mayport Naval Station, FL	343.400	Fort Campbell/Campbell AAF, KY; Whidbey Island NAS, WA
290.600	Futenma MCAS, Japan	343.500	Jacksonville NAS (Towers Field), FL; Cherry Point MCAS, NC; Grand Forks AFB, ND; Corpus Christi NAS, TX
290.625	Tyndall AFB, FL	344.600	Kandahar Airfield, Afghanistan; Fort Richardson/Bryant AHP, AK; Fort Wainwright/Wainwright AAF, AK; CFB Comox, BC; McClellan Airfield, CA; Cape Canaveral AFS, FL; Key West NAS (Boca Chica Field), FL; MacDill AFB, FL; Patrick AFB, FL; Robins AFB, GA; Andersen AFB, Guam; Kaneohe Marine Corps Base Hawaii, HI; Sigonella Naval Station, Italy; Keflavik NAS, Iceland; Grissom ARB, IN; Diego Garcia; Chitose , Japan; Iwakuni MCAS, Japan; Kadena AB, Japan; Kastner AAF , Japan; Miho, Japan; Misawa AB, Japan; Nyutabaru, Japan; Yokota AB, Japan; Andrews AFB, MD; Whiteman AFB, MO; Columbus AFB, MS; Keesler AFB, MS; Bogue MCAF, NC; Pope AFB, NC; Cannon AFB, NM; CFB Greenwood, NS; CFB Shearwater, NS; Wright Patterson AFB, OH; CFB North Bay, ON; CFB Trenton, ON; Willow Grove NAS/JRB, PA; Charleston AFB Intl Airport, SC; Kingsville NAS, TX; Orange Grove NAF, TX; Sheppard AFB/Wichita Falls Muni, TX
296.750	Rota NS, Spain	346.500	Japan - A 511; Daegu AB; Kunsan AB; Osan AB; Suwon
298.300	Kirkuk AB, Iraq	346.550	Holloman AFB, NM
304.300	Fort Drum/Wheeler-Sack AAF, NY	346.600	Eielson AFB, AK; Elmendorf AFB, AK; Hickam AFB/Honolulu Intl Airport, HI
306.000	Atsugi NAS, Japan	348.300	El Centro NAF, CA
306.500	Fort Hood/Hood AAF/Robert Gray AAF, TX	348.800	Fort Rucker/Cairns AAF, AL
308.300	Twentynine Palms MCAGCC, CA	349.200	Peterson AFB (City of Colorado Springs Muni), CO
308.350	Al Dhafra (Muqatra), UAE	349.900	Yuma MCAS/Yuma Intl, AZ
309.000	Hunter AAF, GA	354.600	Laughlin AFB, TX
		355.300	Quantico MCB/MCAF (Turner Field), VA
		356.200	Patuxent River NAS (Trapnell Field), MD
		359.400	Souda Bay, Crete
		359.600	Pensacola NAS (Forrest Sherman Field), FL
		369.225	Rota NS, Spain
		372.200	Camp Buehring/Udairi AAF, Kuwait
		372.725	Ali Al Salem AB, Kuwait
		373.625	Barksdale AFB, LA
		375.200	McConnell AFB, KS; Fort Sill/Henry Post AAF, OK
		375.775	Ellsworth AFB, SD
		376.000	Air Force Academy, CO
		383.250	Dyess AFB, TX
		386.350	NB Ventura County/Point Mugu NAS, CA
		387.400	Oceana NAS (Apollo Soucek Field), VA
		390.000	Al Udeid AB, Qatar
		390.750	Hurlburt Field, FL

## State-by-State through the Upper Midwest

**W**e're getting back into relatively easy DX territory this month in the Upper Midwest.

### Minnesota:

I suppose you would expect decent ground conductivity in the Land of 10,000 Lakes! WCCO-830 Minneapolis is 50,000 watts fulltime, non-directional, and easy reception if you don't have a local station on the frequency. KSTP-1500 in neighboring St. Paul is also 50,000 watts but directional at night (protecting WTWP, Washington), so it will be difficult to log after sunset in the East. In the West, however, KSTP bombs in all night. Both WCCO and KSTP are news/talk stations. Two other 50,000-watt stations operate in the Twin Cities: all-sports KFAN-1130 and religious WCTS-1030. Both direct almost all of their power due north.

A number of smaller Minnesota stations are worthwhile DX targets outside the state. WNMT-650 on the Iron Range north of Duluth, and WBHR-660 in the middle of the state near St. Cloud, are both talk stations. KJJK-1020 Fergus Falls is only 2 kW daytime (less at night) but is frequently DXed. Also often heard are KLOH-1050, Pipestone and KOLM-1520, Rochester.

One Twin Cities station that's not commonly DXed is KUOM-770. At 5 kW daytime-only, it should be widely heard around sunrise and sunset. And the format is certainly unusual: KUOM is the student station at the University of Minnesota. KUOM has also been in the news recently for their FM station on 106.7, the first new Class D FM operation since the 1980s.

### Iowa:

The Hawkeye State also abounds with DX targets. The big station here is WHO-1040, a news/talk outlet in Des Moines. WHO's 50,000-watt, non-directional signal is audible from coast to coast at night. Another big signal in Iowa is KXEL-1540, Waterloo. Like KSTP in neighboring Minnesota, KXEL is directional at night, but its pattern is not particularly tight. KXEL should be DXable in the West if you aren't too close to another 1540 station, and in the East if you're away from the Albany and Toronto powerhouses.

Iowa also has a bumper crop of expanded-band stations, all of them widely DXed. 1630 is KCJJ, Iowa City, with an unusual (for AM) top-40 format. 1650 KCNZ, Cedar Falls (near Waterloo), is a more traditional news-

talk station. And 1700 is KBGG, Des Moines. KBGG is currently running Spanish-language programming. But they appear to be a charter member of the "format-of-the-month club"; who knows what they'll be running by the time you read this!

Some smaller Iowa stations worth listening for include Cedar Rapids' WMT-600 (news/talk), Des Moines' KPSZ-940 (religious, favors the west), and Ames' WOI-640 (an NPR affiliate which will stand out on this frequency!). WOI's nighttime antenna pattern favors the east.

### Missouri:

The powerhouse station in Missouri is St. Louis' KMOX-1120. This, too, is a 50,000-watt non-directional station audible from coast to coast at night. The Show Me State's other 50,000-watt stations use the high power during the daytime only: WHB-810, Kansas City, reduces to 5,000 watts at night and beams all that power straight north and south. KXEN-1010 south of St. Louis beams all its power southwest even during the day. WHB is a worthwhile sunrise/sunset DX target.

Three less-powerful Missouri stations are also worthwhile DX targets. KCMO-710, Kansas City, is 10,000 watts day, 5,000 at night, directional – a good target in Texas or the upper Midwest. KFEQ-680, St. Joseph, has a daytime pattern that favors both east and west at the expense of north and south. And KCSP-610, Kansas City, is one of a handful of regional-channel stations that's non-directional and full-power (5,000 watts) at night. This all-sports station is widely DXed.

(If you've been DXing for awhile, something may look wrong above. WHB-810? KCMO-710? Yes, the two stations swapped frequencies a few years ago.)

### Illinois:

Chicago has more 50,000-watt non-directional stations (four) than any other U.S. city. WSCR-670 (all-sports), WGN-720 and WLS-890 (both news/talk), and WBBM-780 (all-news) are all easily DXable; at least one of these stations should be in the clear at your location.

WMVP-1000 (ESPN Radio) is directional but not very. WMVP should be DXable in the East all night and in the West near sunrise and sunset, if you aren't too close to Seattle. (Unfortunately, WMVP is in part responsible for making Washington State as difficult to

### BEST BETS

#### For Logging the Upper Midwest:

Illinois: WSCR-670, WGN-720, WBBM-780, WLS-890, WMVP-1000, WRLL-1690  
Iowa: WHO-1040, KXEL-1540, KCJJ-1630, KCNZ-1650  
Minnesota: WCCO-830, KSTP-1500  
Missouri: KMOX-1120, KCSP-610  
Wisconsin: WTMJ-620, WISN-1130, WTDY-1670

log as it is!) Chicago's final 50,000-watt station is WYLL-1160, a religious outlet. Their daytime directional pattern is pretty loose, but the nighttime signal is almost entirely north.

In the unlikely case that none of these six 50,000-watt frequencies is DXable at your location, the Chicago area is also home to an expanded-band station. WRLL (no relation to WYLL!) is an oldies station on 1690. WRLL made a long-distance move from downstate Johnston City a few years ago.

### Wisconsin:

I left my home state for last. Unfortunately, it's probably also the hardest of this month's states to DX from many areas, especially in the South. (One Florida DXer recently logged WKSH-1640 for his 49th state!)

Your best targets are probably the state's two expanded band stations. WTDY-1670, Madison, is a news/talk station. WKSH-1640, Sussex, is Radio Disney for the Milwaukee area. Also worth a try are Milwaukee's two 50,000-watt stations: news/talk rivals WTMJ-620 and WISN-1130. Both are 10,000 watts at night, and both are directional north. WISN's pattern is a lot tighter.

Some other powerful Badger State stations include WTSO-1070, Madison (all sports); WMEQ-880, Menomonie (news/talk); WDSM-710, Superior (all-sports: this may appear to be a Duluth, Minn. station, but the city of license is in fact in Wisconsin); and WSAU-550, Wausau (news/talk). All of these beam all their night power (and much of their day power) due north, but should be DXable around sunrise and sunset.

### ❖ Canada's last daytimer: not dead yet?

Last August, I reported Canada's last daytime-only station, CKOT-1510 Tillsonburg, might be going away, replaced by a new FM. In February, I reported CKOT's request



to move to FM had been approved by the Canadian Radio-Television and Telecommunications Commission (CRTC), and the daytime-only AM would in fact go away. However, the FM frequency CKOT had requested was not approved; CKOT was required to apply for a different FM frequency.

CKOT has now done so, requesting 104.7. Their application now calls for the daytime-only AM station to remain on the air, simulcasting the new FM. My guess is that they feel the 104.7 FM signal will not completely duplicate the coverage of the AM signal; they want to keep the AM to continue to cover that portion of the audience that can't get the FM.

### ❖ Speaking of Canada...

Two new ethnic AM stations have been approved in Montreal. A station on 1450 will carry mostly Arabic programming. Another station on 1650 will address the city's Jewish population in French, English, and Hebrew. Both stations will be 1,000 watts non-directional fulltime. (1450 seems a questionable choice of frequency, given the extreme interference levels on this Class C channel! A number of more suitable frequencies appear to exist in the Montreal area, and higher powers could be used. Maybe they didn't figure they could afford enough land to build the necessary directional antenna?)

A third application was denied: The French religious station would have operated on 650, with 5,800 watts daytime (and some undisclosed night power). In Canada, stations are required to present a balance of political and religious views; Christian stations must also present programming about other faiths. The CRTC felt the proposed Montreal station did not have adequate plans for religious balance in their programming. For example, all non-Christian programming was scheduled to air between 11pm and 3am.

### ❖ More Montreal

Listener Mark Morgan in Cincinnati caught WLW-700 off the air on the morning of February 6th. He found a news broadcast in French on 690, but couldn't find any information on this station on the websites he normally checks.

This station is CINF, Montreal. They're co-owned with English-language all-news outlet CINW-940. The company acquired licenses for both frequencies when the CBC surrendered them to move to FM. (95.1 French, 88.5 English).

Many websites don't do a very good job of listing stations outside the US. TV Radio World ([www.tvradioworld.com/search/station\\_finder.asp](http://www.tvradioworld.com/search/station_finder.asp)) seems to work pretty well for Canadian stations. Many other sites rely on FCC data. Canada and other governments do report their stations to the FCC (so that the FCC can avoid authorizing U.S. stations that would interfere with Canadian service, and vice-versa). However, changes that don't affect the possibility of interference (call-letter changes, etc.) are often not reported. Stations

that go off the air may remain "notified" for years.

### ❖ HD Radio

Last time, I asked, "Have you splurged on a HD radio?" Since then, I have. Boston Acoustics cut the price of their Receptor Radio HD to \$299, and I ordered one. I'm working on a more complete review, but I have a few HD observations to begin with. The radio itself is a pleasant surprise. The HD system isn't.

I live about 30 miles northwest of Nashville. We have four HD stations in town: WLAC-1510, WPLN-FM 90.3, WVNS-FM 102.5, and WNRQ-105.9. The WLAC and WVNS transmitters are about 20 miles away; WPLN and WNRQ share a tower about 30 miles away. (WNRQ runs about 20% more power.)

The Receptor HD comes with a built-in AM antenna and a wire antenna for FM, about 18" long. With these antennas I could receive no HD signals at my location. Even analog reception was poor; WLAC actually appeared to be off the air (!) and WNRQ's analog signal was noisy. I could tell WPLN had HD, but the HD signal would never lock.

The Receptor also includes an external AM loop, similar to those sold with many home stereos. This antenna works a lot better. The Receptor HD is actually a quite decent AM DX machine for analog signals. I attached my TV antenna to the FM side, and found it also a decent FM DX receiver. The selectivity of this set is simply superb, and the sensitivity quite decent. But that's about the analog. \$299 is an awful lot of money to spend on an analog radio, no matter how good. How about the HD reception?

On FM, using the TV antenna, all three HD stations come in well. HD proponents won't want to hear it, but I can't tell the difference between HD and analog FM. (At least I don't hear the ugly compression artifacts some listeners are reporting.) WPLN and WNRQ offer "HD2" subchannels; WPLN with an alternative NPR program schedule, WNRQ with continuous oldies.

AM HD reception is extremely difficult. I have yet to be able to hold the WLAC-HD signal for more than a few seconds. Some of this is due to computer noise, and some due to noise coming from the radio itself. When it does come in, it does sound pretty good. I don't know that I'd call it "FM quality," though; by the time the signal is strong and noise-free enough to allow HD reception, the analog AM is strong enough to sound just as good. I can hear compression artifacts on AM HD, though I personally wouldn't find them annoying. (Other listeners might.)

I can tell you that if HD Radio doesn't work any better than this on an expensive radio, it will have no future in areas more than 25 miles from the transmitters. Areas like Longmont, Colorado; Gainesville, Georgia; Waukegan, Illinois; and Salem, Oregon... Can this innovation succeed in the marketplace if listeners in the richest outer suburbs can't use it? I wouldn't count on it...

### ❖ DXing the hard way?

Reader Dan Conley lives in eastern North Carolina, where he's been DXing with a homemade radio. Dan's set uses a 1H5GT regenerative detector and two stages of audio, one another 1H5GT and the other a 1LB4. The set is powered from a D-cell (for the filaments) and ten 9-volt batteries in series (for the high voltage). Dan uses a 60-foot indoor antenna.

Dan has heard two foreign-language stations on this set. Around sunset one winter evening, he heard what appeared to be a Russian-language signal; on another occasion, a station that appeared to be broadcasting in Hebrew was heard around 1 am. I suspect Dan's Russian-language reception was WNWR-1540, Philadelphia, which broadcasts in that language around that time. His Hebrew station is somewhat more difficult to figure out. Another powerful ethnic station on 1540 is CHIN, Toronto, but their website indicates they were not broadcasting in Hebrew (or any similar language) at the time Dan heard it.

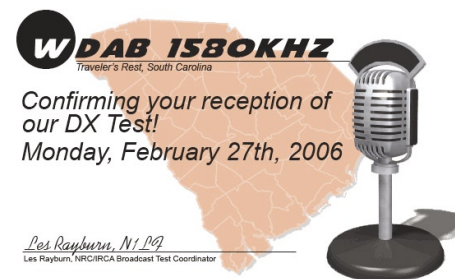
Dan's homemade radio's best DX is WWL-870 and KMOX-1120. Both are pretty decent hauls for a 60-foot indoor antenna on any radio!

### ❖ E-QSLing

WDAB-1580 Travelers Rest, South Carolina, ran a DX Test on the early morning of February 27th. This was the first bilingual DX Test in my memory. (WDAB's normal broadcasts are in Spanish for the area's Mexican-American population.) I reported my reception on the National Radio Club's email discussion reflector; a few days later, an emailed "electronic QSL" arrived from Test Coordinator Les Rayburn. 17 other DXers received this QSL as well, in locations as far from South Carolina as the Oregon coast.

Electronic QSLing sites like [www.eqsl.cc](http://www.eqsl.cc) and [www.arrl.org/lotw](http://www.arrl.org/lotw) are seeing considerable use in verifying ham radio contacts. E-QSLing worked well for this broadcast verification, and I suspect we'll see a lot more electronic QSLing in the future.

*Those who reported the WDAB-1580 DX Test on Feb. 27th received this QSL via email:*



### ❖ 'Till next month

Have you DXed with a homemade radio? Write me at 7540 Highway 64 West, Brasstown NC 28902-0098, or by email to [dougsmith@monitoringtimes.com](mailto:dougsmith@monitoringtimes.com). Good DX!

# Understanding Railroad Radio Transmissions

## INTRODUCTION

Hello. I'm Ernest Robl, a professional journalist – both writer and photographer – specializing in transportation subjects, with a particular emphasis on railroads and rail transit. After this two-part introductory article, which was originally written as a feature, I'll be assuming the railroad coverage for *Monitoring Times*.

Though I live in North Carolina, I've photographed (and listened to) railroad activities all over the U.S., including California, Oregon, and Washington state – and many of the states between there and the East Coast.

Over the years, I've learned much about railroad operations from listening in and I've even been an "car witness" to tragedy when a train engineer called in to the dispatcher to report hitting a van that had driven into the train's path. (I'm an active supporter of the railroad safety organization, Operation Lifesaver, Inc.)

And, of course, my scanners help tremendously with my photography of railroads, as they tell me what's moving in the area and what the next move will be during switching. My railroad photos have been widely used in magazines, textbooks, and calendars.

I've had an interest in radio communications, going back as far as I remember. While in high school, I built a shortwave receiver kit. While serving in the U.S. Army in Vietnam in 1969 and 1970, I bought a multi-band Zenith shortwave receiver (that I still own!) at the PX – so that I could find out what was really happening in Vietnam and the rest of the world.

In the column, we'll explore where to find radio frequencies, what to listen for, and new trends in railroad communications. We'll also look at how a scanner can enhance your train travel experience. And, perhaps I'll see some of you out along the lines or onboard trains. I look forward to hearing from you with your frequency lists,

– Ernest H. Robl

"Number 417 is complete with two boxes checked – numbers 5 and 11 – at 12:41." If you hear that transmission on a railroad's radio channel, what have you just heard?

A dispatcher has just granted a track warrant to a train giving it the authority to occupy and move on a specified segment of track. (417 is the sequential number of the track warrant, as

logged by the dispatcher; the "boxes checked" indicates that specific additional instructions apply. And, 12:41 is the time at which the warrant takes effect.)

## ❖ Movement control systems

Railroads in North America use essentially four different systems for managing the movements of trains and other equipment, though there is some overlap among the systems. We'll first look at the differences in the systems and then go back and look at what types of radio messages you are likely to hear on lines where each of these systems is in effect.

### Movement on sight:

Used primarily in yards or during industrial switching, this system gives the train crew the responsibility for making safe movements and requires operation at speeds that allow stopping within half the distance of sight. In other words, this would allow two engines operating in the same yard to stop short of each other – though in yards where two or more engines are used, additional coordination by radio usually adds another level of safety.

### Direct Traffic Control (DTC):

Used primarily on low-traffic branch lines, this system divides a segment of track into one or more named blocks. A train is then given sole authority to occupy that block or those blocks. The train crew releases the block after either leaving the block to enter another block or by clearing the main line and restoring the main line switch (turnout) to its normal position.

### Track Warrant Control (TWC):

This system can manage more complex traffic situations on lines with more trains but without lineside signals controlled by a dispatcher. TWC requires crews to copy movement authority onto a specific form, called, of course, a track warrant. The track warrant, in conjunction with other rules applied by the railroad, can manage meets between trains, one train following another train on a line, and also the operation of maintenance equipment on line segments.

Slightly different versions of track warrants are in effect in different parts of the country, depending on the version of operating rules used by a railroad. When a crew from

FORM 11369 (Rev. 5/02)  
(113699)

**NORFOLK SOUTHERN  
TRACK WARRANT**

No. \_\_\_\_\_, 20\_\_\_\_

To: \_\_\_\_\_ At: \_\_\_\_\_  
(Mark "X" in box for each item instructed)

1. ☐ Track Warrant No. \_\_\_\_\_ of \_\_\_\_\_ is void.

2. ☐ Proceed from \_\_\_\_\_  
To \_\_\_\_\_  
On \_\_\_\_\_ Track

3. ☐ Work between \_\_\_\_\_  
and \_\_\_\_\_  
On \_\_\_\_\_ Track

4. ☐ This authority expires at \_\_\_\_\_ M.

5. ☐ Not in effect until after arrival of \_\_\_\_\_  
and \_\_\_\_\_ and \_\_\_\_\_  
At \_\_\_\_\_

6. ☐ Hold Main Track at last named point.

7. ☐ Do not foul limits ahead of \_\_\_\_\_  
and \_\_\_\_\_ and \_\_\_\_\_

8. ☐ Clear Main Track at last named point.

9. ☐ Between \_\_\_\_\_ &  
make all movements at Restricted Speed. Limits occupied  
by train or engine.

10. ☐ Between \_\_\_\_\_ &  
make all movements at Restricted Speed and stop short  
of men or equipment fouling track.

11. ☐ Protection not required against following trains on same  
track.

12. ☐ Other specific instructions: \_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

OK \_\_\_\_\_ M Dispatcher \_\_\_\_\_  
Copied By \_\_\_\_\_

OS Loc \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_ By \_\_\_\_\_  
OS Loc \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_ By \_\_\_\_\_  
OS Loc \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_ By \_\_\_\_\_  
OS Loc \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_ By \_\_\_\_\_  
OS Loc \_\_\_\_\_ Date \_\_\_\_\_ Time \_\_\_\_\_ By \_\_\_\_\_

Limits Reported Clear at \_\_\_\_\_ M  
By \_\_\_\_\_

one railroad operates on the tracks of another, usually under a trackage rights agreement, it is responsible for having the proper track warrant forms for that railroad.

### Centralized Traffic Control (CTC):

Under CTC, a dispatcher at a central location controls signals, the indications of which manage train movements. The system has built-in logic that prevents the dispatcher from authorizing conflicting movements and trains from getting too close to each other. Early systems of this type used relays to manage the logic circuits; today these systems use



*Amtrak trains, other than at locations where Amtrak itself owns and dispatches the tracks, use the radio frequencies of the host railroads. The northbound Amtrak "Carolinian" (Amtrak train 80) is making its daily station stop at Raleigh, N.C., on Norfolk Southern tracks. Therefore at this location the engineer and crew is using NS frequency 160.95 MHz.*

sophisticated computer programs.

## ❖ Application and overlap

DTC and TWC both replace an earlier and now obsolete system called Time-Table Train Order (TTTO or just TO) operation. TTTO relied on a complex timetable to govern the movement of scheduled trains and train orders to manage exceptions, such as special unscheduled trains, or trains running so late that their normal schedule no longer applies. TTTO existed in the days before widespread availability of two-way radios on railroads.

It relied on agent-operators based at many locations along the railroad. A dispatcher would formulate a train order using standard syntax prescribed by operating rules, and would then send that order to an operator or to multiple operators at different locations, first by telegraph and later by telephone or teletype.

The operator(s) would repeat the order back to the dispatcher, and the order would not take effect until all designated receiving locations had repeated it back correctly. The operator was then responsible for getting the order to the applicable train or trains. For trains originating at his location, the crew would have to sign for a copy of the order or orders before leaving.

(Orders were typed – usually, but they could also be hand-written, by the operators on sheaves of very thin paper interleaved with carbon paper, called flimsies, making it possible for an operator to produce many copies at one time.)

*When you're stopped at a red signal, it's time to talk to the dispatcher. However, this eastbound Norfolk Southern train is waiting to cross CSX tracks at Selma, N.C., and the interlocking is controlled by CSX – so it's the CSX dispatcher the crew needs to talk to.*



For trains passing a given location, the operator would, depending on the nature of the orders, either set a manual signal for the train to stop and sign for orders or would hand them up to the crew as it passed his location.

Today, operators are rare, with most freight railroads having few staffed lineside locations. Instead, DTC or TWC authority is transmitted to the crew by radio. To ensure safe operation, both the DTC and TWC authorizations have to be repeated back to the dispatcher and do not take effect until after the crew has read the entire message back to the dispatcher and the dispatcher acknowledges that the message has been received correctly.

Both DTC and TWC dispatching usually is computer based, with the computer assisting the dispatcher in preventing the issuance of overlapping or conflicting authority for movements.

## *How do dispatchers talk to crews spread out over wide areas?*

Typical base station radios used by railroads usually have a range of 20-30 miles in flat or hilly terrain, though transmitters with antennas on high terrain can often reach much further. For a small shortline with only 40 miles of track, a single transmitter can reach all trains and other personnel on the line, if that transmitter is centrally located and has a high-enough antenna tower.

On larger railroads, dispatchers talk to crews through remote base stations. These transmitters are linked to the central dispatching center by landlines or microwave links.

The remote station normally listens in standby mode until a dispatcher wants to talk to a train in its area. Then the dispatcher selects the applicable remote transmitter by pushing a button or touching a box on a touch-screen computer monitor. When the dispatcher keys his microphone, the transmitter transmits; when the transmission ends, the dispatcher can listen to the response from out in the field through the remote base station.

If a train or track crew wants to talk to the dispatcher, the mobile radio transmits an alert tone, keyed in on a numeric keypad, similar to that of a telephone. (Where remote base stations are closely spaced, each will have its own alert code, so that only one station is activated by the tone.)

When a remote station receives its alert tone, it sends a signal back to the dispatching center, which is displayed to the dispatcher as a flashing light or blinking symbol on a computer monitor. When the dispatcher is ready to talk, he activates the base station and transmits something like, "Dispatcher answering Jonesville call-in." The calling party then identifies itself and the exchange of information takes place.

The limited range of both the remote base stations and the radios on locomotives and in railroad vehicles allows all operations along a long stretch of track to use the same frequency, without interfering with each other. When trains or crews are close to each other, they can hear each other.

## *Why the overlap in the train management systems?*

Because signal systems can fail and some types of work equipment cannot be detected by signal systems. And, there are lines with a simple signal system called Automatic Block Signals (ABS). These signals only indicate the occupancy of track segments (providing an additional level of safety against head-on or rear-end collisions), but do not give trains authority to move. ABS is actually a subset of CTC, with all of the ABS functionality also incorporated into CTC operation.

In case of a major failure of a signal system, possibly as a result of some type of natural disaster, a dispatcher can issue a general order to all trains that the signal system is out of service and then operate trains by track warrant control. In this case, operation usually takes place at much slower speeds, because the safeguards offered by the signal system are no longer available.

Similarly, even in signaled areas, a dispatcher will need to issue a track warrant to track maintenance workers, giving them exclusive use of a segment of track. That track warrant is then locked into the dispatching computer, preventing the computer from authorizing any moves through that area until the track warrant is released.

Track inspectors (and some maintenance workers) typically ride in hi-rail vehicles – normal highway vehicles ranging from SUVs and pickup trucks to large dump trucks equipped with retractable flanged wheels that allow them to operate on tracks. These vehicles can change over from highway to rail mode on any paved surface, usually a road grade crossing. Most of these vehicles do not automatically register track occupancy for signal systems, and even the ones that do would not do so until the flanged wheels are down. Therefore, all such movements require track warrants, even in CTC territory.

Now that we've taken a simplistic overview of the basic four traffic management systems, next time we'll cover the kinds of radio messages you are likely to hear when these systems are in operation. See you in September!

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- ♦ SWL IR Remote for Lowe HF-150, HF-225 \$79.95
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# Your Logs & Letters

**A**s often occurs in the spring, I've received a welcome surge in correspondence from readers reporting their best DX of the winter season. This month, we'll share some impressive loggings and pass along other news items from radio's basement band.

### ❖ SAQ (17.2 kHz)

Have you ever wanted to hear a station below 25 kHz—one that is sending something other than encrypted data? Well, you may get your chance on July 2<sup>nd</sup>, the next scheduled transmission date for SAQ, the historic Alexanderson alternator located at Grimeton, Sweden. This date is being observed as Alexander Day, in honor of the transmitter's inventor, Ernst F.W. Alexanderson (1878-1975). During a test on February 19th, a total of 15 U.S. listeners (mostly along the East Coast) reported hearing this station on its 17.2 kHz frequency (CW mode).

SAQ is a working exhibit commemorating what was considered cutting-edge technology back in the 1920s. It uses an electro-mechanical transmitter, and is the only such station left in operation in the world. For full information, check out the SAQ web site at [www.alexander.n.se/](http://www.alexander.n.se/).

### ❖ Mystery Solved

In mid-February, I received numerous reports of a new signal that had appeared on 454 kHz near Hagerstown, MD. The station was heard as far away as Georgia, North Carolina, and Virginia and was sending data bursts every second, along with continuous data at 1 kbps.

After some detective work by several monitors, it was determined that this is a Differential GPS (DGPS) station used to improve the accuracy of GPS signals in the vicinity of Hagerstown. A similar station is believed to be active in Pennsylvania at 458 kHz. You can download a sound sample of the 458 kHz station at <http://ve3hls.tripod.com/noise/noise-files/unid-458khz.mp3>.

Interestingly, the MD station uses a former Ground Wave Emergency Network (GWEN) site and is connected to its 300-foot "hot" tower. The transmitter power is a hefty 10 kW, so it is capable of considerable range, especially at night. The choice of 454 kHz for this station was probably not given a great deal of thought. This is only 1 kHz away from the fixed 455 kHz Intermediate Frequency (IF) used in most modern radio receivers! This could cause severe interference to a nearby receiver, regardless of the frequency it is tuned to.

My thanks to Perry Crabill (VA), Brock

Whaley (GA) and MT's Bob Grove (NC) for assistance in finding the origin of this station. I would appreciate reports from others who hear such signals in their locales.

### ❖ North to Alaska

Jerry Brookman, KL7CMN wrote with a listing of beacon logs from his monitoring post in Kenai, AK. He writes: "I enjoy your column in MT. I've been interested in longwave for quite a while, but never enough to put a LOWFER beacon on the air, or even to put up a decent antenna—although I could probably string up a decent Beverage antenna where I live! I've listened for LW beacons for the past 25 years or so—first with a Kenwood R-300, then with a Kenwood R-600 from 1983 until 1990, and since then with a Kenwood R-5000. For the past 15 years or so I've used an Alpha-Delta DX-SWL Sloper antenna. Over the years, the RF noise level in my area has slowly but surely increased. I'm not sure what the cause is—undoubtedly a multitude of causes—including light dimmers, street lights, computers and other modern conveniences. The logs listed below were all made between 1441 and 1459 UTC."

Additional loggings this month are supplied by Ron Perron (MD) who uses an Icom R-75 receiver connected to a 90-foot wire in a horizontally deployed triangle configuration. Although the antenna is installed in an attic, Ron reports good results on the lower frequencies.

Table 1. Selected LW Logs

Freq.	ID	Location	By
153	LWBC	Russia?	J.B. (AK)
216	CLB	Carolina Beach, NC	R.P. (MD)
233	ALJ	Hinchinbrook Island, AK	J.B. (AK)
260	YSQ	Atlin, BC	J.B. (AK)
277	ACE	Homer, AK	J.B. (AK)
283	DUT	Dutch Harbor, AK	J.B. (AK)
279	LWBC	Russia?	J.B. (AK)
325	BVK	Buckland, AK	J.B. (AK)
329	YHN	Hornepayne, ON	R.P. (MD)
335	YLD	Chapleau, ON	R.P. (MD)
341	DB	Cold Bay, AK	J.B. (AK)
350	VTR	Takotna River, McGrath, AK	J.B. (AK)
351	YKQ	Waskaganish, QC	R.P. (MD)
365	ZP	Sandspit, BC	J.B. (AK)
366	YMW	Maniwaki, QC	R.P. (MD)
371	PDN	Port Heiden, AK	J.B. (AK)
371	FND	Ellicott City, MD	R.P. (MD)
378	RJ	Roberval, QC	R.P. (MD)
382	JNR	North River, AK	J.B. (AK)
391	DDP	Dorado, PR	R.P. (MD)
392	ML	Charlevoix, QC	R.P. (MD)
411	ILI	Iliamna, AK	J.B. (AK)
429	DGG	Red Dog, AK	J.B. (AK)
525	ICW	Nenana, AK	J.B. (AK)
530	ADK	Adak, AK	J.B. (AK)

### ❖ What the Others are Saying

An interesting discussion on Longwave DXing appeared on the e-Ham.net website back in February. As of press time, the material was still available for viewing at: <http://www.eham.net/articles/13150>.

The Longwave Club of America's website reports that Robert Helliwell's classic book, *Whistlers and Related Ionospheric Phenomena*, is back in print in an affordable paperback edition. If you'd like a scientific explanation of what's behind these amazing signals, you may want to add this one to your bookshelf. Full ordering information is online at: [www.lwca.org](http://www.lwca.org).



Mike Leahan (WI) supplied this photo of MS/400 kHz in Monona, Wisconsin

### ❖ Hamfest Season

It's time for my yearly plug of what I believe is one of the best hamfests in the U.S! The Rochester (NY) Hamfest is celebrating its 72<sup>nd</sup> year in 2006, and the event has historically been a great place to find LF-related gear and components. This year's fest will be held June 2, 3, 4. Full information is available online at: [www.rochesterhamfest.org/](http://www.rochesterhamfest.org/).

See you next month!

## Longwave Resources

✓ **Sounds of Longwave** CD or Audio Cassette (please specify) featuring WWVB, Omega, Whistlers, Beacons, European Broadcasters, and more!  
**\$13.95** postpaid

✓ **The BeaconFinder** A 65-page guide listing Frequency, ID and Location for hundreds of LF beacons and utility stations. Covers 0-530 kHz.  
**\$13.95** postpaid

Kevin Carey  
P.O. Box 56, W. Bloomfield, NY 14585

## WRMI and FM Pirate Cause Interference

**A**ccording to reports in several Florida newspapers and CNN, the FCC was alarmed in late March when a hip-hop and Haitian music FM pirate on 107.1 MHz was interfering at times with aircraft communications at Miami International Airport. So, the FCC sent in agent Joseph Zeller (no relation to your columnist) to ward off this dangerous interference from the FM pirate. During the course of this investigation it was discovered that the interference was not coming entirely from the FM pirate.

Surprisingly, the FCC found that licensed shortwave broadcaster **WRMI**, Radio Miami International, was the source of some of the interference. Upon notification from the FCC, **WRMI** head Jeff White quickly detected and fixed the problem. The station was temporarily using a poorly tuned backup transmitter during late March, but a couple of immediate engineering adjustments quickly eliminated the harmful interference.

Ironically, of course, many of the programs relayed on **WRMI** are quasi-clandestine anti-Castro broadcasts directed toward Cuba.

### ❖ Cumbre DX Adds Pirates

Hans Johnson, the main maven at *Cumbre DX* (but by no means the only hard working DXer associated with Cumbre) tells *MT* that Cumbre has changed its policies and that it now welcomes information about difficult pirate radio DX loggings. For many years this has been an excellent resource for clandestine radio loggings as well.

The e-mailed information at Cumbre is sent out to individuals who contribute regularly. If you are interested in this good source of information about rare and difficult DX, then you can check out the organization on the web at [www.cumbredx.org](http://www.cumbredx.org)

### ❖ Insurgente Mexican Logs

Hans Johnson also points out that amazingly, several DXers including he himself in Florida and Dave Valko in Pennsylvania have occasionally been hearing the Mexican clandestine **Radio Insurgente** on Fridays at 2100 UTC on 6000 kHz. From Florida this is a difficult catch, but in states like Pennsylvania and other northern areas during the summer, the station is generally an impossible target, given its time and frequency selection. But, for those living in the southeastern United States, this one is well worth a try on Friday afternoons.

### ❖ Afghanistan FM Radio Battle

According to the Associated Press, a radio war literally broke out in Afghanistan during late March. In Badshahkili, near the Pakistan border, two FM stations owned by rival Muslim clerics began broadcasting criticisms of each other. That led to violent battles in which at least 24 people were killed. Fighting included exchange of hand grenades, small weapons fire, mortar fire, and rocket propelled grenades. The local stations are not clandestine operations, but in that relatively lawless region the radio broadcasts led to military violence.

### ❖ What We Are Hearing

*Monitoring Times* readers heard two dozen different North American pirates this month. You can hear them, too, if you use some simple techniques. Pirate radio stations never use regularly announced schedules, but shortwave pirate broadcasting increases noticeably on weekends and major holidays such as Memorial Day and the 4<sup>th</sup> of July. You sometimes have to tune your dial up and down through the pirate radio band to find the stations, but more than 95% of all North American shortwave pirate broadcasts are around 6925 kHz, plus or minus 30 or 40 kHz.

**Captain Morgan-** If you hear a classic rock format mixed with audio from the old Twilight Zone TV show, you probably have this one "from the pirate zone." (None, says to send loggings to the Free Radio Network web site)

**Channel Z Radio-** This rock music pirate often features obscure selections not often heard elsewhere. They have relay arrangements with some European pirate transmitters. (Blue Ridge Summit)

**Cherokee Asylum Radio-** This odd one tells a sad tale of Graham Conner in the Cherokee Mental Asylum in Iowa, where he says "Radio is my friend, my friend is radio" repeatedly. (Uses [cherokeemental@yahoo.com](mailto:cherokeemental@yahoo.com) e-mail)

**Grasscutter Radio-** Like its sister station Sunshine Radio, this pirate features classic rock music. (Uses [grasscutterrado@yahoo.com](mailto:grasscutterrado@yahoo.com) e-mail)

**Ground Zero Radio-** Dave Gunn's station has switched to a country music format lately, but their focus on nuclear war dangers continues. Recent shows were announced as tests of a Corsair transmitter. (Elkhorn)

**Kracker Radio-** Their parodies, comedy, and novelty music has an ethnic focus. (Uses [Merlin and crackerradio@pmoll.com](mailto:Merlin and crackerradio@pmoll.com) e-mail)

**KSUR-** Big Daddy primarily transmits instru-

mental rock music and ocean surf noise. His format is advocacy for surfing culture. (Uses [ksurradio@yahoo.com](mailto:ksurradio@yahoo.com) e-mail)

**MAC Shortwave-** This new one is maintaining a rock music and comedy format. ([macshortwave@yahoo.com](mailto:macshortwave@yahoo.com))

**Partial India Radio-** Some sharp eyed *MT* readers noticed that we had a typo on their maildrop a few months ago in this column. They remain the best pun in the history of pirate station names. (Stoneham)

**Pirate Radio Boston-** Their rock music fare often has a New England focus. (Stoneham)

**Progressive Music Radio-** The diverse format on this new one includes classical and rock music as well as dramas. (Unknown)

**Sunshine Radio-** This pirate has a classic rock format with a female announcer. It is thus distinctive in a male-dominated field like pirate radio. (Uses [grasscutterrado@yahoo.com](mailto:grasscutterrado@yahoo.com) e-mail)

**Take It Easy Radio-** Their rock music always includes their theme song by The Eagles, as well as other rock tunes. (Merlin)

**The Crystal Ship-** The Poet's left wing political commentary and rock music use a slogan as the "Voice of the Blue States Republic" on 6875 kHz and other variable frequencies such as 1710, 3320, 6854, 6925, and 9057 kHz. (Belfast and uses [tcsshortwave@yahoo.com](mailto:tcsshortwave@yahoo.com) e-mail)

**Undercover Radio-** When you hear Dr. Benway "from the middle of nowhere," then you have found this one. (Merlin and uses [undercoverradio@mail.com](mailto:undercoverradio@mail.com) e-mail)

**Voice of Captain Ron Shortwave-** Captain Ron normally features rock music pirate programming. (Uses [captainronswr@yahoo.com](mailto:captainronswr@yahoo.com) e-mail)

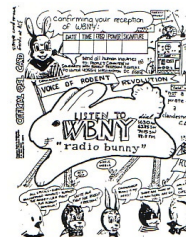
**Voice of Pancho Villa-** The annual appearance of Pancho at the Winter SWL Festival in Kulpville, PA, was not widely heard outside the Fest hotel. (Belfast)

**Voice of the Runaway Maharishi-** This one is one of Captain Ganja's comedy and drug advocacy stations. (Belfast)

**WBBL-** Also known as the Voice of the Prince of Darkness, this grim station tells the story of several individuals who become deceased DXers after listening to the station. (Uses [WBBLSW@netscape.net](mailto:WBBLSW@netscape.net) e-mail)

**WBNY-** Commander Bunny, the operator of the rodent revolution, still has a mix of Easter music, yodeling, and digital and voice broadcasts. The QSL that we see here this month is antique. (None, but has said on the air that it will QSL Free Radio Network postings)

**WBZO-** This station specializes in making fun of certain DXers.



Continued on page 61



## Before It's Too Late!

I received a call recently from a neighbor asking me to help him out with something. An older gentleman in our neighborhood, who was also a ham, passed away last fall. This old friend we called "Bubbe" WA2YOB died without any family to speak of. He had named my neighbor as executor of his estate with simple instructions to sell everything and see that the proceeds went to several of his favorite charities. How I was to become involved in this was, YOB had left behind a modest but very fine radio shack and the executor wanted me to help him value the ham gear and see to its sale.

As we went about the process of finding new homes for YOB's equipment, it set me to thinking about how many times such situations must occur within our hobby. All too often, the ham who goes Silent Key is the only person in the household who possesses the knowledge sufficient to accurately value his or her equipment. Also, that ham may have specific ideas about where they might want their amateur radio legacy to end up after they have gone beyond. Further, I have heard

far too often about how unsuspecting widows have been duped into thinking their spouse's ham gear was nearly worthless only to have it sold by some "entrepreneur" for thousands of dollars.

So this forces us to spend a little time thinking about the unthinkable – our own eventual demise. Yep, it's going to happen to all of us eventually. Just like writing a will and buying life insurance, we may, as hams, want to put a few minutes' thought into seeing that our family and friends get a fair shake if they ever find themselves in the sad position of liquidating our ham radio assets.

There is also a positive side to this while we remain corporeal: Identifying all your equipment and its current fair market value can help document replacement costs for your insurance company should anything be stolen or destroyed in some personal disaster.

### ❖ Personal Radio Inventory

This can actually be a fun part of the process. I have mentioned in past columns that the various gear in my radio shack tends to exist in three phases, with equipment moving between these three groupings as the mood takes me.

First, there is the active station, the radios I actually have wired up to power and antennas getting regular use. Then there are my more collectable pieces. Most of these radios come down off the shelf from time to time to join in the fun but mainly reside in semi-retirement on shelves where they serve to inspire me. (Nothing gets the QRP blood flowing like glancing over at my Heathkit HW-8).

Finally, there's what may best be called my "spare" radios. Rigs that work just fine but have moved down to the basement lab or up into my attic to await sale, trade or eventual return to service. Of course I keep a good list of these in my head, but that is of no use to my family if anything were to happen to me, nor would it stand up to much scrutiny by an insurance adjuster. So how to proceed to make this all make sense?

We are lucky enough to live in the modern digital age. Many folks have, or have access to, a digital camera. It doesn't have to be anything fancy,

it just needs to be able to take snapshots of each individual piece of equipment in your personal amateur radio world. It would then be fairly easy to port these pictures over to your personal computer and associate each graphic with a few lines of text that list the following information to the best of your knowledge:

- 1) Brand Name and Model Number of the item
- 2) Serial Number
- 3) Original Cost
- 4) Current Replacement Cost
- 5) Location of Original Sale Receipt
- 6) Location of Manual or Other Relevant Documentation

Now the first three items on my list are fairly self evident. But let's take a bit of a look at the second three items because they can be very important for any future replacement or sale.

### Current Replacement Cost

Thanks to such things as on-line auctions and Internet based ham radio want ads, it is fairly easy to get a good ball park figure on what just about any piece of equipment might be worth in the current market. An investigation of on-line prices will usually reveal a range in value.

To use my old friend Bubbe's station as an example, he had an older model Yaesu FT-101 transceiver. It was very clean and worked just fine. I found examples of this rig on the Internet at prices ranging from \$150 through \$250. I also learned that the rig's 6JS6C final tubes are getting a bit hard to come by, making this a radio that would appeal to a particular kind of user or collector. So with this information in mind, it seemed that around \$200 was a fair asking price. Had the radio shown signs of heavy use or had been significantly modified (Many FT-101's found their way into CB stations where they served to give their users a significant leg up on the 5 watt competition), it would have been fairer to list it at a much lower price.

Let's face it folks, we can all be a bit short-sighted when it comes to our own shacks. Everything we own is NOT in mint condition, just waiting in a pristine state for a serious collector to come by and empty out his or her bank account just to own our particular examples of ham radio excellence. Be fair in your estimation of your equipment's value. It will make for a quick sale and a satisfied customer. Also, if it is a situation where you are waiting for a check from the



*The buzzards may not be circling, but they're waiting patiently on top of W4HNC's tower, which he purchased from the estate of a Silent Key.*



insurance company, you are less likely to be disappointed at the amount if you have been honest in your estimation.

### Location of the Original Sales Receipt

Having your receipts in a file that is easily located can have lots of uses. In this case, it provides a number of important facts. It verifies you as the original owner of a piece of equipment. The buyer will know it isn't third or fourth hand. For insurance purposes, nothing proves something was really in your home better than proof of purchase. For any future sale, the receipt also serves to verify relative age of a piece of equipment. Some really great ham radio gear has been sold over time spans of ten years or more in the same configuration. Being able to pinpoint age can help make a sale, once again, at a fair and reasonable price.

### Location of Manuals and Other Documentation

I cannot begin to tell you how many times I have passed by a piece of gear at a hamfest because it was being sold without a manual. If your shack is anything like mine, your manuals tend to wander away from your radios. If you keep your manuals a bit organized, they will be available not just to your family in the days after you are gone, you may actually be able to find them when you need one to get a rig back on the air in the midst of a major contest.

Also, as you well know from reading this column, very few things in my shack stay unmodified for very long. I always document any modifications in the back pages of my manuals and make relevant notes on any schematics. Well documented modifications do not need to detract from a sale. In some cases, if they are known and sought after modifications, they may even enhance the rig's value.

### Computer Literacy...Or Not

I have made what most of us probably think to be a sage suggestion here, taking the time to catalog and store pictures and information about ham radio equipment on a personal computer. Now having said that, are you certain that there is going to be a computer literate person around to find that information and make use of it? The best solution might be to print the pictures and information out and store it with other important papers such as your will or insurance documents. If the list is too complex, it may be wise to store the information on a CD ROM with specific instructions as to how the information can be read out via computer.

I also talked about using the Internet as a place to both determine prices and ultimately make sales. But let's not forget the more traditional routes within the radio hobby. Local ham clubs can be great resources for information as well as places where items might ultimately be sold. Some clubs have swap and sale nights in addition to traditional hamfests. In my area there are two repeater groups that offer swap nets one evening per week. Obviously, to take advantage of that, someone

would need to be or know a licensed amateur radio operator. So, in addition to listing your equipment for your family, you may want to list your club affiliations and contact information. You can also include a list of trusted ham radio friends.

So far we have talked mostly about finding ways to sell off ham gear after someone goes Silent Key. But there is yet another possible place to go with this line of thinking. Why not consider making sure some, if not all, of your equipment goes to helping get new or needy hams on the air? My friend Mary Lau N1VH reminded me that many young hams are not only grateful to receive the radio equipment of passed hams, they are often honored by the gift. Once again, a local ham club may be the best group of folks to help see that such equipment gets moved along to newcomers. There are also larger organizations such as Handi-Hams ([www.handihams.org](http://www.handihams.org)) that would welcome such donations.

But now, on to the really important stuff. Helping to see that my old friend's ham radio equipment was fairly sold was important, but had very little meaning to me. But as we were cataloging the various pieces of equipment and tracking down which desk drawers contained which manuals, we opened a drawer that contained the most valuable items in the shack: Bubbie's log books, QSL cards and his Awards. They have no real monetary value, but they are the priceless record of the radio operating history of WA2YOB. The executor gave them to me and I humbly accepted stewardship of these items. I will also check with the incoming DX Bureau to make sure any cards that remain in the pipe do not get discarded. I will see that these items are preserved and shared with present and future hams at every opportunity.

Take a little time to see to your own ham radio legacy. It is important. I'll see you on the bottom end of 40 meters.

### UNCLE SKIP'S CONTEST CALENDAR

**Asia-Pacific Summer Sprint, (SSB)**  
Jun 10 1100 UTC - 1300 UTC

**ARRL June VHF QSO Party**  
Jun 10 1800 UTC - Jun 12 0300 UTC

**West Virginia QSO Party**  
Jun 17 1600 UTC - Jun 18 0200 UTC

**All Asian DX Contest, (CW)**  
Jun 17 0000 UTC - Jun 18 2400 UTC

**SMIRK Contest**  
Jun 17 0000 UTC - Jun 18 2400 UTC

**Kid's Day Contest**  
Jun 17 1800 UTC - 2400 UTC

**ARRL Field Day**  
Jun 24 1800 UTC - Jun 25 2100 UTC

**QRP ARCI Milliwatt Field Day**  
Jun 24 1800 UTC - Jun 25 2100 UTC

**His Maj. King of Spain Contest, (SSB)**  
Jun 24 1800 UTC - Jun 25 1800 UTC

### Outer Limits continued from Page 59

(Belfast)

**WHYP-** The James Brownyard memorial pirate still features rock and pirate comedy from North East, PA. (Belfast and uses [whypradio@gmail.com](mailto:whypradio@gmail.com) e-mail)

**WPTR-** Having borrowed its call letters from a licensed Albany, NY station, the station ominously warns that listeners will all get flat tires if they listen to the program. (None)

### ❖ QSLing Pirates

Reception reports to pirate stations require three first class stamps for USA mail-drops or \$2 US to foreign locations, especially in Europe where the value of the US dollar has plunged considerably. The cash defrays postage for mail forwarding and a souvenir QSL to your mailbox. Letters go to these addresses, identified above in parentheses: PO Box 1, Belfast, NY 14895; PO Box 109, Blue Ridge Summit, PA 17214; PO Box 69, Elkhorn, NE 68022; PO Box 146, Stoneham, MA 02180; and PO Box 293, Merlin, Ontario N0P 1W0.

Some pirates prefer e-mail, bulletin logs or internet web site reports instead of snail mail correspondence. The best bulletin for submitting pirate loggings with a hope that pirates might QSL is now the e-mailed Free Radio Weekly newsletter, still free to contributors via [yukon@tm.net](mailto:yukon@tm.net). A few pirates will sometimes QSL reports left on the Free Radio Network web site, at [www.frn.net](http://www.frn.net) on the internet. Unfortunately, given the demise of *The ACE*, that formerly widely read bulletin can no longer be used in order to notify pirates that a listener heard a broadcast.

### ❖ Thanks

Your loggings and news about unlicensed broadcasting stations are always welcome via 7540 Highway 64 W, Brasstown, NC 28902, or via the e-mail address atop the column. We thank this month's valuable contributors: Dave Balint, Wooster, OH; Lee Banner, Fishkill, NY; Kirk Baxter, North Canton, OH; David Baden, Washington, DC; Artie Bigley, Columbus, OH; Jerry Coatsworth, Merlin, Ontario; Bill Finn, Philadelphia, PA; Harold Frodge, Midland, MI; William T. Hassig, Mt. Prospect, IL; Harry Helms, Smithville, TX; Hans Johnson, Ochop-ee, FL; Harald Kuhl, Germany; Ed Kusalik, Coaldale, Alberta; Chris Lobdell, Stoneham, MA; Greg Majewski, Oakdale, CT; Larry Magne, Penn's Park, PA; John Poet, Belfast, NY; Mike Prindle, New Suffolk, NY; Fred Roberts, Germany; Jim Ronda, Tulsa, OK; Martin Schoech, Eisenach, Germany; John Sedlacek, Omaha, NE; Lee Silvi, Mentor, OH; Robert E. Thomas, Bridgeport, CT; Gayle Van Horn, Brasstown, NC; Pancho Villa, Belfast, NY; Bob Wilkner, Pompano Beach, FL; and Joe Wood, Greenback, TN.

*The editors apologize for the repeated column in the printed edition of the June issue. You will find the correct June Outer Limits text (which ran in the MT Express edition) posted for convenient download or print-out at [www.monitoringtimes.com/html/mtouter0706.pdf](http://www.monitoringtimes.com/html/mtouter0706.pdf)*

## Building or Buying Your Antennas: Part Two of Two

Last month we discussed some pros and cons of building or buying your own antennas. One point from that discussion was that antennas that you build yourself can usually be expected to perform just as well as commercially-manufactured antennas. But whether you build your own antennas or buy them, it is worth your while to learn a bit about how various antennas perform in order to choose wisely from the many antenna designs available. So let's start by checking out some of these resources.

### ❖ Antenna Literature:

The *ARRL Antenna Book* is the most complete, technician-level source of antenna theory and how-to-make-it for a wide variety of antennas. In addition, ARRL publishes a number of other good antenna texts. Joe Carr's *Practical Antenna Handbook* is an excellent source of information on building your own antennas. *W1FB's Antenna Notebook* gives a lot of how-to directions along with useful, practical information on how the antennas perform.

Perhaps the best technician-level treatment of how to make antennas, how they perform, and what to expect from them is L. B. Cebik's (W7RNL) two-volume series *From the Ground Up*. Grove Enterprises's CD titled "Antennas for Radio Communications," contains a very-useful compilation of antenna information in Bob Grove's *The Antenna Factbook*, plus the second edition of my own *The Antenna Handbook*, which covers a lot of practical antenna information as well as how-to-build-it antenna designs.

For hams concerned with the effects of SWR and with honestly describing antenna performance, Kurt N. Sturba's series of books, *Aerials*, is recommended. Also journals such as *Monitoring Times*, and *QST* frequently have

articles on do-it-yourself antennas. For another list of useful antenna books, check out W4RNL's web site at: [www.cebik.com/abook.html](http://www.cebik.com/abook.html)

Sources for obtaining these and other antenna books include the ARRL (225 Main St, Newington, CT 06111); radio-supply houses which advertise in *Monitoring Times* such as Universal Radio, Radioware (<http://www.radiobooks.com>, PO Box 209, Rindge, NH 03461), MFJ Enterprises ([mfjenterprises.com](http://mfjenterprises.com), P.O. Box 494, Mississippi State, MS 3976), and Worldradio, ([www.wr6wr.com](http://www.wr6wr.com), 2120 28th Street, Sacramento, CA 95818). Also check your local library. If they don't have the book you want, ask if they can get it on inter-library loan.

The ARRL ([www.arrl.org](http://www.arrl.org)) has a lot of good information on antennas and other radio technical topics. To access much ARRL info you must become a member (which isn't a bad idea: you get the journal *QST* as part of ARRL membership). On the web perhaps the single best source of high-quality antenna projects and information, aside from the ARRL site, comes from W4RNL: [www.cebik.com](http://www.cebik.com)

### ❖ Commercial Antennas:

Commercially-manufactured antennas have the advantage that you don't have to spend your time constructing them. Just about any kind of antenna you might need for monitoring – DXing, scanning, or ham-radio work – is available commercially. The most commonly-available and the least expensive are the wire antennas such as the dipoles and trap antennas. These antennas are usually employed on MF and HF. Also commonly-available are the ground plane antennas, and these are utilized from MF through HF, VHF and UHF. Beam antennas in the Yagi-Uda and quad designs are available for HF, VHF and UHF.

Sources of ready-made antennas include: Grove Enterprises ([www.grove-ent.com/antennas.html](http://www.grove-ent.com/antennas.html)), Universal Radio, Radioware, MFJ enterprises, and Radio Shack ([www.radioshack.com](http://www.radioshack.com)). Many antenna suppliers – too many to list here – advertise in *QST*.

### ❖ The Truth and Other Oddities:

Technical specifications which antenna manufacturers offer on their antennas cover such measurements as size, weight, radiation and reception patterns, and antenna gain. Usually you can trust the first three of these measurements to be reasonably accurate. However, it is not uncommon to find claims for gain to be misleading, or even in considerable error.

It helps to know that gain values are found by comparing an antenna's gain to the gain of the theoretical isotropic antenna – reported as dBi, or to the gain of a halfwave dipole antenna – reported as dBd (table one). Confusion can arise from the fact that an antenna will appear to have 2.1 dB more gain when compared to the lower-gain isotropic antenna than when compared to the dipole (because the dipole has 2.1 dB more gain than the isotropic).

Some manufacturers will report the higher dBi gain figures without including the "dBi" symbol to indicate that the reference antenna was isotropic. This leaves the way open for the potential buyer to assume that the manufacturer's antennas have more gain than those of another manufacturer who reports gain as compared to a dipole.

Claims of gain levels that are clearly unrealistic are also sometimes found in manufacturer's antenna specs. Table one offers some fairly-typical gain levels for various antenna types. These gain values are intended as approximate, or ball-park values. If advertised antenna gain values differ dramatically from those in table one it seems likely that they are incorrect. It's important to realize here also that high gain, by itself, is not necessarily of value. Keep in mind that antennas with low, even negative gain levels, such as the discone, can be very useful antennas offering excellent performance.

### ❖ Not to Worry:

Sometimes special antennas are important for good communication. But if your radio needs are simple don't overlook the fact that you can have a lot of fun with very simple antennas, and inexpensive radios.

ANTENNA TYPE	GAIN dBi	GAIN dBd
ISOTROPIC.....	0.....	-2.1
DISCONE .....	.3 .....	-1.8
1/4 WAVELENGTH VERTICAL WITH GROUNDPLANE .....	.3 .....	-1.8
SHORT DIPOLE .....	1.7 .....	-.4
HALF WAVELENGTH DIPOLE .....	2.1 .....	0
HALF WAVELENGTH VERTICAL W/ GROUND PLANE .....	2.1 .....	0
1 WAVELENGTH LONG WIRE .....	2.5 .....	.4
5/8 WAVELENGTH VERTICAL WITH GROUND PLANE.....	3.3 .....	1.2
2 ELEMENT YAGI-UDA.....	7.1 .....	5
2-ELEMENT QUAD .....	9.1 .....	7
4-ELEMENT YAGI-UDA .....	12.1 .....	10

**Table One.** A comparison of gain levels typical of various antenna designs. The gain levels are given as found when the antenna is compared to the theoretical isotropic antenna (dBi), and when compared to a half-wavelength dipole (dBd).

#### This Month's Interesting Antenna-Related Web site:

The following *Monitoring Times* web addresses lead to discussions about the performance of three different antennas, and directions which I've written for building and using your own antennas:

##### A random-length antenna:

[www.monitoringtimes.com/html/mtanten-naprimer1.html](http://www.monitoringtimes.com/html/mtanten-naprimer1.html)

##### Halfwave dipole:

[www.monitoringtimes.com/html/mtanten-naprimer2.html](http://www.monitoringtimes.com/html/mtanten-naprimer2.html)

##### Ground plane antenna:

[www.monitoringtimes.com/html/mtanten-naprimer3.html](http://www.monitoringtimes.com/html/mtanten-naprimer3.html)

## RADIO RIDDLES

### Last month:

"Just what is the 'static' referred to by the letter-group QRN discussed above? Where does static come from, and what causes it? The term 'static' means 'immobile,' or 'stationary.' What is immobile, or stationary about radio static?"

Well, the noise in question is the result of discharges of atmospheric static electricity. This atmospheric electricity is static in that it builds up as an electrical charge that remains in one location (static) until its voltage is sufficiently high to cause a spark. It will then discharge into some

other portion of the atmosphere, the earth, or even our antennas. Just as with the old spark-gap wireless transmitters each spark generates radio-frequency signals at many different frequencies. When these signals reach our receivers they make a popping noise called "static."

Many of these sparks are relatively low-amplitude discharges and can come from particles such as snowflakes, or sand blowing in the wind and collecting an electrical charge, then discharging when they encounter your antenna. This is sometimes called "precipitation static." On the other hand, a lightning bolt is an extremely large spark that generates very powerful radio waves.

The sound these waves make in a receiver is also known as "static," or more properly as "atmospherics" or simply "spherics." These waves are naturally-caused radio waves, and they can propagate through the atmosphere just as do the radio waves from our transmitters. Often there are so many of these bursts of noise continuously propagating in to our antenna from many places in the world, that we hear them as a continuous crackling noise in our receivers. Sparks generate progressively less energy at higher frequencies, and thus static is usually not a problem for reception above the HF band.

### This Month:

Wave guides are used in microwave work to route radio waves from transmitter to antenna, or antenna to receiver. They are designed to guide the waves without leaking and wasting any wave energy along their route. Yet, for certain antenna

applications, wave guides are intentionally made leaky. Why?

You'll find an answer to this month's riddle, another riddle, another antenna-related web site or so, and much more, in next month's issue of *Monitoring Times*. 'Til then Peace, DX, and 73.

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## Taking on the 1933 Silvertone

Last month, we took a first look at our latest restoration project: a circa 1933 Silvertone (Sears Roebuck brand) low-end receiver. The little set, priced to fit Depression budgets, utilizes a simple TRF (tuned radio frequency) circuit instead of the more sophisticated superheterodyne design. As such, it required only three tubes plus the rectifier tube. This month, we'll plug in the soldering iron and begin the actual restoration work.

### Correction and Comment

First, I have to correct a misconception I left you with last month: namely that this radio is not equipped with a dynamic speaker (that is, a speaker equipped with an electromagnet, or field coil). It actually does have such a speaker and looking at the partial schematic of Figure 1, you can see how I made this mistake.

There is no field coil shown associated with the speaker or as part of the power supply filter (where it is normally energized while doubling as a filter choke). Instead, the filter circuit has a dedicated choke – quite unusual in a bare bones radio designed to be manufactured as cheaply as possible. Take a closer look at the circuit and you'll spot the fine print identifying the speaker field, which is energized by being connected from one of the 25Z5 rectifier tube cathodes to ground.

This also looks like a good place to acknowledge a comment just received from reader Perry Crabill, W3HQX, after he had

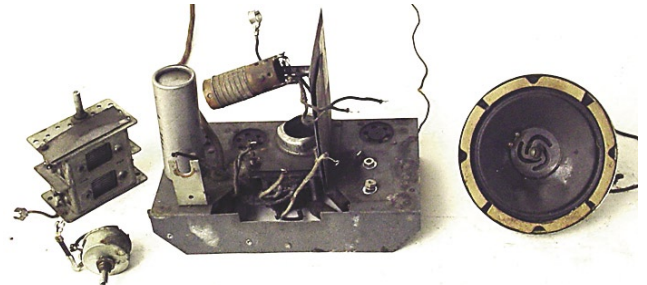
read the April column.

*Your article about A.C.-D.C. "Depression Radios" in the April Monitoring Times reminded me of those days. I remember that part of the downtown section of Washington, DC, had 110 volts D.C. commercial power for years. One thing you didn't mention was that an A.C.-D.C. radio plugged into D.C. power might not work until you turned over the power plug. If it happened that the voltage presented to the plate of the rectifier tube was from the negative side of the D.C. power line, the rectifier wouldn't conduct and the set would be dead even though the filaments were lit, along with the pilot light, if it had one. However, all you had to do was to turn the plug over to present the proper polarity to the rectifier. Line cord plugs and power outlet sockets were not polarized in those days, which made it easy.*

### ❖ Stripping the Chassis

I've already mentioned that this is about the grimmest chassis I've ever worked on. To facilitate cleaning, I removed the tubes as well as three major above-chassis components: the speaker, tuning capacitor and volume control. This will give me access to most of the upper surfaces.

Cleaning the crowded wiring below the chassis will be a different story. There won't be much I can do here except to get into as many crevices as I can with a stiff brush.



Removal of the speaker, volume control and tuning capacitors provides much better access for cleaning.

Later, as I remove the old paper capacitors, one by one, for recapping, I'll gain access to additional areas where I can ply my brush.

Speaking of recapping, it looks like I'll need to gut the innards of the 3-section electrolytic capacitor can and install individual modern replacements inside. Normally, I would simply disconnect the can, leave it in place for looks, and install the individual replacements under the chassis. But, in this case, I'd be hard pressed to find room for them!

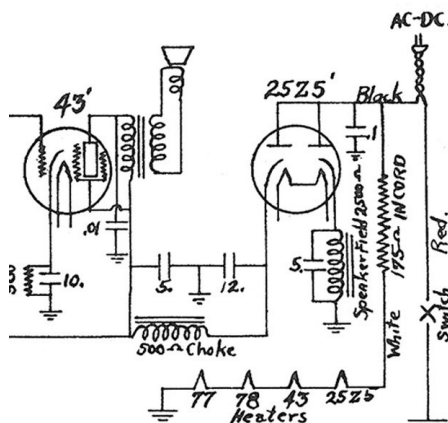
One positive discovery was that the insulation of most, or all, of the hookup wire under the chassis is okay. Some readers may remember the problem I had with the brittle rubber insulation on much of the wiring of the last a.c.-d.c. set I restored in the column. There was no solution for that except for wholesale replacement.

With the speaker removed from the circuit, it was easy to check the speaker voice and field coils. Both were okay, and the field was close to the 2500-ohm value specified in the schematic. I was mildly surprised to find that all four tubes also tested okay.

It's not unusual to find one of the tubes in an a.c.-d.c. heater series string burned out. Heaters in this type of service are very vulnerable because of the current inrush that takes place when the set is first turned on.

### ❖ Stripping the Cabinet

Besides stripping down the chassis as far as possible, there is also the job (not one of my favorites) of stripping the heavy coating of cream-



Instead of doubling as the power supply choke, the speaker field receives its voltage directly from the 25Z5 rectifier (see text).



Under the chassis, this little radio is about as crowded as it can be.



As paint is stripped off, original finish is revealed. Note Silvertone name partly visible on volume control bezel.

colored paint (with peach accents) added by a previous owner. I'm using a methylene chloride stripper that comes as a heavy gel that clings to surfaces after being brushed on. This is nasty stuff that burns one's skin after just a few seconds of contact. It also emits very unhealthy fumes. Best to work outside and use gloves!

One coat of the stripper makes the paint wrinkle up and seem to let go after several minutes have passed. However, I've found that it takes three or four coats of stripper, each followed by a gentle putty-knife scraping, to clean a particular area. It's best to do small areas (maybe 50-60 square inches) at a time. The stripper dries out if left on too long and then loses its effectiveness.

Handled this way, the stripper effectively removes the paint, the original lacquer or varnish finish underneath, and some of the walnut stain. I was pleased to see the Silvertone logo begin to appear on the still-bright metal volume control bezel as it emerged from under its load of paint.

The catalogue picture of this set shown with last month's column suggests a dark, almost grainless, finish on most of the cabinet with a lighter, heavily-grained finish within the fancy border incised on the front panel. I don't see any sign of this lighter-grained finish unless it was photo-



One of many worn spots in the line cord reveals frayed wiring. The asbestos-covered lead in the center is the resistance element.

graphically applied and disappeared with the stripping. However, my guess is that it was an advertising fiction.

As this is written, the stripping is about one-third completed. I expect that my refinishing technique will involve applying fresh walnut stain over the original to see if I can even it out. This will be followed by an application of varnish (or varnish stain if further evening-out is needed).

## ❖ Replacing the Line Cord Resistance

As mentioned last month, the four tubes in this radio account for a voltage drop of 62.6 at their rated current of 300 mA (0.3 A). To build up this voltage drop to approximately 115, so that the series string can be run directly from the a.c. (or d.c.) line, a series resistor of 175 ohms was added. Look at just to the right of the speaker field shown in Figure 1 and you'll see this 175-ohm resistor with an indication that it is in the set's line cord.

Thoroughly discussed last month were the reasons why these line-cord resistors are almost invariably open and that new-old-stock resistor line cords – if one could even be located – are also defective. Certainly the one on this radio isn't even worth testing. Its plug is missing and there are numerous threadbare and abraded spots along the cord itself. So what is the restorer to do?

The problem might be solved by substituting a standard power resistor for the line cord resistor. If the schematic didn't happen to list the size of the line cord resistor, it could be computed using Ohm's law ( $R=E/I$ ).  $I$  is the current in amperes drawn by the tubes. Just look up the current drawn by any one of the tubes to get the current flowing in the series string. In the case of our radio it is 0.3 amps.  $E$  is the voltage to be dropped by the power resistor.

As mentioned, the heater voltages of the four tubes add up to 62.6. Let's assume a line voltage of 120 volts, which would mean that  $120-62.6=57.4$  volts is the required voltage drop. Using Ohm's Law:  $R=57.4/.3=191$  ohms. Note: the engineers who specified the 175-ohm line cord resistor assumed a line voltage of 115 – which was closer to 1930s standards.

Using an ordinary two-wire cord with a separate power resistor mounted in the set is electrically possible. However, room inside most of these cabinets is limited, as is ventilation for the extra heat that would be developed. In the case of the Silvertone, the 191-ohm resistor carrying the .3 amp current drawn by the tubes would dissipate:  $P^2R=(.09)(191)=$  a little over 17 watts of power.

The size and heat dissipation of the resistor can be reduced by placing a diode rectifier in the series string

– thus operating the heaters on pulsating d.c. rather than a.c. The output of the diode would be 85 volts (with little heat dissipated within it). Don't be misled by any d.c. meter readings you may make; neither digital nor analogue meters give correct values on pulsating d.c.

With a diode in the string, the voltage drop for the resistor would be:  $85-62.6=22.4$ . Again using Ohm's law, the value of the resistor would be:  $E/I=22.4/.3=$  a little under 75 ohms. The power dissipated in the resistor would be:  $I^2R=(.09)(75)=6.75$  watts. This amount of heating shouldn't cause a problem in the cabinet if the resistor can be kept away from sensitive components.

Another way of dropping voltage is to use a series capacitor, which behaves as a resistor, but with insignificant heat dissipation, when passing a.c. The problem is that the large sizes required are readily available only as electrolytic capacitors, which do not work in this application. Non-polarized capacitors designed for a.c. applications, or d.c. capacitors rated at least 400 volts, should be used. These can be hard to find, especially in a form compact enough to fit inside a small radio.

The value of a capacitor required to drop 57.4 volts in our Silvertone is a little over 8 uf. I'll explain how I obtained that in next month's column, by which time I will have decided on which method of voltage dropping is to be used in our restoration.

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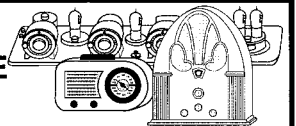
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## Cordless Phones - Let the Buyer Beware

By Lee Badman

Here's a typical scenario – you need a new telephone at home, so off you go to the neighborhood department store. Most stores offer several models, with a range of accompanying prices. Many people tend to look first at price, then maybe consider how the phone might look hanging in the kitchen or sitting on the desk. Perhaps the appeal of a system that lets you use a couple of handsets comes into play. Some mental gymnastics are done, a shiny new phone in its excellent packaging gets rung up, and a new phone goes into service in your home for a couple of years. No news here, right? Unfortunately, it very well might be a big deal – if thoughts of security are left out of the cordless phone purchase process.

Many of us are getting ever more wise to the increasing number of various threats to our privacy that pervade modern life. We know enough to not let the guy behind us see our PIN get entered into the ATM. We are more mindful of email scams, Internet-borne worms, and spyware that might contribute to identity theft as we use our computers. Even in traffic, our every move may be on video – so we buckle up and slow down to stay legal. But the simple act of talking on the phone is easy to take for granted – yet using the wrong phone may be giving away the farm when it comes to personal information and details of our lives that we may not want the general public to know about.

Even *MT* readers could use the reminder that cordless telephones are radio devices. As such, signals are transmitted, and it's often anybody's guess where those signals go (I personally have never seen an antenna pattern diagram for cordless phones). But there are some assumptions that most consumers – including many in the radio hobbies – share about cordless phones. For example, it's a safe bet that most people envision that the base and handset of their cordless phones can only "talk" to each other. It's also assumed that the interaction between the handset and base of a given cordless phone is somehow "protected" from casual eavesdropping. And most folks – if asked – would probably assume that their cordless phone signals are not going much farther than the walls of their home or apartment.

The uncomfortable reality is that many consumer-class cordless phones contradict all of these assumptions. And it gets worse: Many phones are flat-out misrepresented in both packaging and available technical literature, so it's hard to tell what you might be getting "under the hood," even when trying to shop smart.

### Fundamental Problem #1

Most consumer devices that rely on transmitted signals – from wireless networking components to garage door openers – play in unlicensed spectrum. Cordless phones are no different. And all communications-oriented devices in the unlicensed spectrum sandbox are pretty much at each other's mercy. We're talking about baby monitors, wireless intercom systems, FRS radios, cordless phones, wireless microphones, and more. If one device can pick up another's signals, well, that's just the way it is... and most users assume that limited range (and perhaps some unnamed technical magic) will make the products safe to use.

The onus is definitely on the consumer to use these devices with care, and little in the user guide jumps out to tell us as much. Chances are that the typical consumer is probably unaware that scanners, ham radios, and wideband communications receivers can often receive every single frequency in use by all of these communications products – at a far greater range than might be expected.

One day while working at Syracuse University, my Uniden BCT-246T scanner was doing its stuff in the background. Even though my office is in the basement of an old fortress-like building with walls of several-feet-thick concrete, the scanner picked up a phone conversation from the next building over with its "Close Call" feature. In this case, the call belonged to a faculty member who I work closely with on occasion – so I was comfortable sharing my findings with him for his own good – especially since he is a "wireless guru" who

teaches and writes about wireless networking and related topics. The revelation made for some lively chat – more on this story in a bit.

### Fundamental Problem #2

So far, nothing discussed here is big news to most scanner enthusiasts – we've known about the listings for baby monitor and cordless phone frequencies all over the Internet for years. So, you'd think that when we look to purchase cordless phones, our knowledge would make us better shoppers. Conventional wisdom would dictate that if we don't want to be eavesdropped on in the same bands that pick up baby monitors and FRS radios, then we should buy phones that operate in other bands – maybe 2.4 GHz or 5.8 GHz, where the typical scanner or wideband receiver have no "ears."

Now for the problem: Even phones that are labeled as 2.4 GHz or 5.8 GHz often work at the lower frequencies with little or no notification to the user. In other words, a 5.8 GHz cordless phone might also be a 900 MHz phone – and unless you're monitoring, you'd never know.

### ❖ Real-World Cases

Back to my professor friend – in this case he had the Panasonic KX-T9000, an older cordless phone that works in the 900 MHz range. The Professor was in disbelief – one of the foremost experts on wireless networking and security was talking business daily – often sensitive business – on a phone that could obviously be listened to by a relatively low-cost consumer receiver!

Yes – the act of listening to cordless phone conversations is illegal – but it's also 100% passive and in most cases undetectable, so unless the eavesdropper brags about what he's hearing, the law is irrelevant. One of the Prof's first questions as he tried to take it all in was "...yeah, but how many people really have scanners?" After we talked of volunteer firemen, news reporters, NASCAR fans, and ham radio operators with rigs that have extended receive functions, the potential for his personal and business-related conversations falling on many unintended ears became very clear.

The icing on the cake? The fact that with a mouse-click, I could have recorded his conversation with the ARC246 scanner control software running on my computer. (Sound files can be manipulated, forwarded, or used for a slew of nefarious purposes.) Finally, a Google search of "Cordless Phone Frequencies" turned





up frequencies for many phones, including the KX-T9000. It was quickly replaced by a new model in hopes of better security, after the full gravity of the situation was finally impressed upon the good professor.

Closer to home, I was shocked one day to pull into my driveway as my Yaesu FT-90R mobile dual-band amateur radio was scanning through its programmed channels, and it settled on the unmistakable voices of my wife talking with her mother. A check of the channel showed she was booming through on one of the FRS radio channels (between 462.5625 and 467.7125), despite the fact that she was talking on a General Electric 2.4 GHz cordless phone!

I purchased this phone after reading of the eavesdropping dangers of phones NOT in the higher frequencies – and so was quite taken aback to see a unit labeled 2.4 GHz was even capable of working in another slice of spectrum altogether. After reviewing both the box that the phone came in and the “manual” (a one-page how-to), I could find no mention of this phone being equipped with circuitry for other bands, yet I could demonstrate the effect at will by using the phone and monitoring it with the FT-90R, my BCT-246T scanner, or the Icom R3 receiver – all were in agreement that the GE Model 27998GE6-C 2.4 GHz phone was indeed operating far from the 2.4 GHz spectrum I expected it to use.

Chalking up the GE phone to a malfunction or other anomaly, it was off to WalMart for a replacement. Looking over all the offerings (and carefully reading the packaging), I settled on the modestly priced Uniden EXAI5580. With a box that was plastered with “5.8 GIGAHERTZ” all over it – and no mention of lesser frequencies anywhere on the feature list – I went home feeling good about replacing the traitorous GE for this new super-sleek phone.

After charging the unit, I had my son make a call while monitoring with the BCT-246T. My blood boiled – there in the 900 MHz range on my scanner was my son’s entire conversation with one of his buddies – the full-duplex happy banter of a couple of young teenagers – that wasn’t supposed to be on that frequency. My mind filled with dread – are all cordless phones like this?! Is the conspiracy that widespread?

I went to Uniden’s web site, to reread the list of specifications, which confirmed that this was supposed to simply be a 5.8 GHz phone. I went through the manual page-by-page. Surely there must be some explanation, some narrative about how and why this phone would ever use frequencies other than the 5.8 GHz that was touted online and on the box it came in. Finally – 51 pages into the manual, I found a single reference that the phone used frequencies between 925.181 MHz and 927.451 MHz – but no explanation as to when or for what. It was time for a phone call to Uniden.

## ❖ Even the Manufacturers Seemed Confused

My first call to Uniden was downright bewildering. The first customer service rep I

spoke with told me that she didn’t understand the frequency issues I was describing. After putting me on hold, she came back and said that the base of the phone talks to the handset at 5.8 GHz, but the handset talked back to the base on the 900 MHz. When I told her that the scanner was picking up both halves of the conversation on a single discreet 900 MHz frequency, her supervisor got on the phone and echoed what she had told me and insisted that my particular phone must be malfunctioning. Though I was skeptical, I swapped the phone for another one – and found the same condition.

Another call to Uniden – and this time another story – but one that at least made more sense. It turns out that indeed the 900 MHz frequencies are used – for “extended range.” Unfortunately for me, this seems to mean anywhere in my house, including a foot from the base of the phone. When I mentioned that the packaging does not say that 900 MHz is used, the rep I spoke with disagreed, and told me it was stated very clearly on the box.

After looking the box over again, I still could not find reference to 900 MHz – until I turned to the side that was printed in Spanish, where I found in very, very small letters “*Este producto combina las frecuencias de 5.8 GHz y de 900 MHz, las cuales aumentan la claridad.*” That was it: the only reference that product was not 100% 5.8 GHz, and it wasn’t even in English. (At least the second Uniden rep agreed that the labeling left much to be desired.)

Back to the GE phone – calls to Thompson (who handle service on GE Cordless phones) were not free, nor productive. After lots of time on hold at my cost, I could not find anybody willing to spend any time on the issue, or who would address that the packaging and manual left out the fact that in this case, 2.4 GHz means “2.4 GHz and the easy-to-eavesdrop 462.5625 – 467.7125 MHz range.”

Finally, after looking at many phones on many shelves from several manufacturers, I found that most cordless phones being sold today do not make mention of anything other than their “primary” frequencies of 2.4 GHz and 5.8 GHz – which can certainly give consumers a false sense of security when shopping based on frequency alone.

## ❖ Spread Spectrum (and privacy codes) to the Rescue

By now, we know that 2.4 GHz is not always 2.4 GHz, and 5.8 GHz is hardly 5.8 GHz exclusively when it comes time to sell cordless phones. Maybe the truth is too technical for the masses, so it just gets left out.

Whatever effect or philosophy is at work, there is a solution for safely buying a cordless phone. Sticking with 2.4 and 5.8 GHz is where it starts – but make sure any phone bought is using Digital Spread Spectrum (DSS) between both the base and the handset and back.

This “breaking up” of what would otherwise be a narrow-band signal adds greatly to security, as evidenced by the military’s long-running use of spread spectrum. But, the security brought by spread spectrum does little

good if your neighbor has the same phone and picks up your conversations (or makes outgoing calls on your dime) because the hardware is the same. This is where privacy codes, addressable phones, or whatever else the manufacturer chooses to call the mechanism comes in – you want a base-handset pairing that doesn’t allow other uninvited phones to participate. Other benefits of Digital Spread Spectrum are less susceptibility to interference (same holds true for wireless networks built on spread spectrum), and usually slightly better realized power.

Remember – Digital Spread Spectrum is not the same thing as “Digital” – digital cordless phones might prevent eavesdropping, but some digital phones “switch over” to analog for increased range, unbeknownst to the user. If security is your goal, don’t settle for digital – go for Digital Spread Spectrum. Also, “frequency hopping” is not spread spectrum – it simply means the handset chooses between available frequencies for the clearest signal.

Cordless phones, like wireless networks and radios, give amazing flexibility and portability to communications. Unfortunately, to the unwise, cordless phones can be as dangerous as Internet scams or losing your wallet for identity theft and similar problems. Know the score on cordless phones, and if there’s any doubt on the radio goings-on with a given phone, leave it and move on. Finally – use that scanner or receiver and audit your home or office cordless telephones. What you find might shock you.

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# MT **REVIEW**

## SWLing on the Road with Sony's XR-CA660X

By Ken Reitz KS4ZR

I have to admit that I'm a refugee from satellite radio. For years I've had either Sirius or XM units in the car, but, as time passed and subscription fees climbed, I called it quits and sought an alternative. As a lifelong SWLer, I was disappointed in the lack of international broadcasters on either satellite service. Sure, XM carries the BBC World Service, and Sirius carries a truncated version as well as the wheel of rebroadcasts from World Radio Network. And, just recently, Sirius added CBC Radio One and CBC Premiere Plus, while XM added Canada 360 and Franc Parler. But, I was looking for more diversity, a wider range of broadcasters, some really esoteric music and an end to "cable's disease," constantly rising monthly rates. That's why I turned to old fashioned shortwave radio in the car.

Over the years I've looked at mobile SWLing using portable shortwave radios, downconverters (tuning devices which convert your existing in-dash AM radio to tune the shortwave bands), even mounting my general coverage ham transceiver in the car. But, they all had drawbacks. I found that portable radios were cumbersome, not easily tuned, poor audio quality and susceptible to ignition and other electrical noise. The downconverters were easy to mount and hook up, but most were also susceptible to ignition noise and required a certain amount of mathematical gymnastics to determine the frequency.

With the exception of the LFB Short Wave Converter\* most were also poor performers. The ham transceiver was very sensitive but was bulky, not easily mounted (and a high risk of theft), suffered from poor audio but was less susceptible to ignition noise. The only thing left to do was to install a real in-dash AM/FM/SW radio.

### ❖ Stalking the Elusive In-Dash SW Radio

You might think that finding a shortwave radio for your car would be as simple as going to your local consumer electronics superstore. But, today there are only two manufacturers of in-dash shortwave radios: Becker and Sony. Both are hard to find.

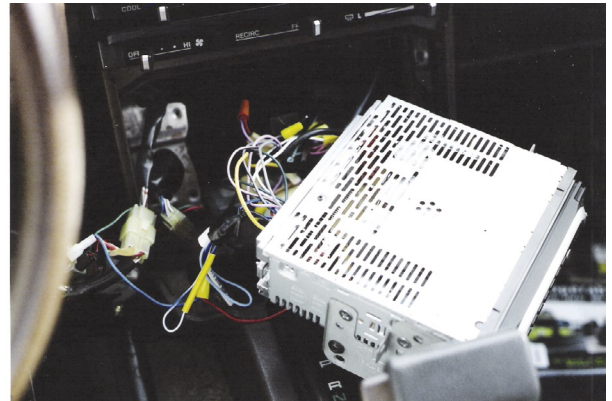
Several dealers in the U.K. are selling the Becker Mexico Pro line. Cost is around \$450 (U.S.) plus ship-

ping. The Becker's price is high and SW coverage limited, so I checked out what Sony had to offer. In North America there is only one Sony dealer still selling in-dash AM/FM/SW radios: Durham Radio in Ontario, Canada. Worldwide, the only other Sony dealer selling these radios is an on-line retailer in the United Arab Emirates called Jacky's. Jacky's price is considerably cheaper, but the express shipping and customs duties make the final price more expensive than Durham Radio.

Durham Radio sells their products at [www.shortwavestore.com](http://www.shortwavestore.com). They stock two similar radios but with a \$100 price difference. The Sony XR-CA660 is identical to the Sony XRF5100 except that it tunes the AM band in 9 kHz steps instead of 10 kHz steps (the XRF5100 is actually switchable between the two steps). It also tunes only to 1620 kHz, whereas the XRF5100 tunes to 1710 kHz.

I've done a lot of AM band DXing in my time, but not in the car. My own interests were being able to receive the FM and SW bands, so I opted to save the \$100. But if you feel you need the AM capability, you should opt for XRF5100. Both radios replace previous models and are in keeping with Sony's policy of changing the face plates and various features every couple of years to "update" the line. Both feature built-in cassette decks which, if nothing else, may be used to play satellite radio, MP3 players or iPods in the car.

I ordered the XR-CA660 from TheShortwaveStore.com and received the unit 7 days later. Total cost, including shipping was \$204. After taking the unit out of the box and perus-



*Use small wire nuts to connect the new wiring harness to your stock speaker and power wires. Installing the radio requires patience and a couple of hours of your weekend. (Courtesy: Author)*

ing the installation manual, it was time for the hardest part of this project: in-dash installation.

### ❖ A Wiring Nightmare

I put my radio in a 1985 Toyota Celica, a relic from days gone by before auto designers made it very hard for consumers to do their own radio installations. If you can't do the installation yourself or simply don't want to risk making a complete mess of the installation, take it to a local auto sound installer.

Once I pulled the radio out of the center console I found there was a rat's nest of wires. Before I did anything else, I tagged each of the wires and then cut them from the harness plug which did not fit the input on the new radio. To my horror, I found that none of the wire colors on the old radio seemed to match the wire color scheme on the new radio.

Later, I also found out that snap-on wire harnesses are commercially available which convert the old wiring harness to adapt to the new wiring system. No cutting necessary!

But if you find, as I did, that such a harness may not be available for your car, don't panic! Go to [www.installdr.com](http://www.installdr.com). Yes, the good doctor has a wealth of car radio installation advice including a page which shows the wire colors for virtually any car and the typical color equivalent for the new radio. With a printout for my car in hand I went back to the project with renewed confidence.

The first thing you have to do is



*Sony XR-CA660X AM/FM/SW radio brings two bands of shortwave listening and great audio at a reasonable price. Has built-in cassette deck and detachable front panel. (Courtesy: Durham Radio)*





**Sony XR-CA660X installed in-dash and tuned to BBC World Service to Africa on 15.400 MHz. Clean lines, easy operating and excellent sound quality are Sony hallmarks. (Courtesy: Author)**

determine which wire carries the main 12 volts D.C. to power the radio. There will also be a 12 volt line to the ACC position on the ignition which allows you to have the radio on without turning on the engine. Use a volt meter to find these wires. Before you connect any wires, make sure the black ground wire is attached first to a metal component connected to the chassis. This may prevent accidental shorts while you're sorting out the wires.

Next, bundle wires you know you won't be using, such as amp and CD changer controls, etc. to get them out of the way. When you find the correct matching wires, strip about a quarter inch insulation from the ends and twist the two together. I used small wire nuts to secure the connection, though you can use electrical tape instead. Tug on the wire nut to make sure it's secure. When you're hooking up the wires make sure the key is out of the ignition.

Once you have all the wires connected (don't forget to attach the antenna!), slip the plug into the back of the radio and get ready for the smoke test. Turn the key to ACC and the unit should come to life. When I did there was sound coming from one of the four speakers and the display on the radio read FAILURE. Not a good sign.

A quick check with the owner's manual (which is in English and Arabic) showed that the display meant that the speakers were not hooked up properly. I believe this stemmed from a difference of opinion between **installdr.com** and me as to which colors were pink, purple and green. After some trial and error among the 12 remaining wire options, I hit pay dirt and all four speakers were working.

## ❖ The XR-CA660 in Action

Like most car audio products today, this radio comes with a credit card sized IR remote control, though all the functions are easily done via the radio's detachable front panel. In fact, the controls for this radio are nearly identical to other Sony radio products. Among the amenities of this particular radio are a three-band equalizer (fancy bass/treble controls); three FM band selections with six pre-sets each (considerably more than most will need); the aforementioned MW band (also

six pre-sets) and two bands of shortwave, each with six pre-sets. There are a few other controls for use with optional out-board amps and CD changers (though they will only be compatible with Sony products) as well as advanced features for the cassette deck, if you actually have cassettes.

I found reception on the FM band equal or better than any other in-dash receiver I've used. The audio was excellent, the equalization scheme easy to adjust and made some difference in listening pleasure. The cassette player is great. It has a snappy drive motor which can zip you to the end of a tape in a hurry. The

amp in this unit is capable of delivering excellent audio. The limits will be in your speaker system: the better the speakers the better the sound.

You might be skeptical of a shortwave radio using only a 29-inch whip, but since this is essentially what most portables use you won't be surprised to learn that it does very well picking up the traditional international powerhouses. This radio has two "bands" which are SW1 (2.940-7.735 MHz) and SW2 (9.500-18.135 MHz with a gap between 10.140 and 11.575 MHz). You can think of these bands as "day" and "night" bands, with the higher frequency band most active in daytime and the lower frequency band more active at night.

Now, Sony doesn't want you to be tuning the radio hunting DX when you're supposed to be driving, so tuning is done via the "seek" button. Pressing the "mode" button a few times eventually brings the radio to the SW1. Press either the "seek +" or "seek -" buttons and the unit tunes up or down the band. Press the mode button once more and you're on SW2. Again the "seek +" or "seek -" does the tuning. Save any station received by pressing and holding one of the six preset buttons.

Sony set the receive sensitivity at just the right level. It will pick up fairly weak stations but won't stop at every spike of atmospheric noise. When it lands on a station, the exact frequency is indicated on the front display. It was afternoon by the time I finished the installation. SW1 was fairly dead, but the first pass through SW2 netted Radio Netherlands at 17.735, VOA's Africa service at 15.580 and 15.240, WWV at 15.000, BBC's Africa service at 12.095 and 15.400.

In the morning Radio Canada International's service to North America on 9515 comes in with the power of a local station. All your state-side favorites such as WWCR, WWRB and WYFR are easily heard. Devotees of the late Dr. Scott can catch his recorded teachings 24/7 from the car. Spanish speakers will enjoy tuning into live World Cup action this summer as many stations will be carrying the play-by-play.

It's one thing to sit in your driveway tuning the bands with the engine off and another to be out on the highway where your ears

have to compete with local electrical and road noise. The weaker stations were less audible in the noise, but the powerful internationals came right through without a problem. Ignition noise was not apparent.

There was, of course, the typical signal fading, a trademark of SWLing, and in the summer you can expect to hear a certain amount of atmospheric static, too. But, to many of us that's part of the charm of analog SWLing. If you listen to shortwave broadcasts for content, you'll be really happy with either Sony product. And, if you speak French, Spanish, German, Portuguese, or Arabic, or are a student of any one of these languages, this radio is a great language skills builder. It's possible that future generations of either version will add an MP3 or iPod input on the front panel and a CD slot to replace the cassette. But, that may be years in coming.

## AVAILABLE FROM:

Durham Radio Sales & Service, Inc.  
10-1380 Hopkins Street  
Whitby, Ontario, Canada L1N 2C3  
888-426-1699 [www.shortwavestore.com](http://www.shortwavestore.com)  
They carry both the XRF5100 (\$289) and XR-CA660 (\$189) plus shipping (about \$15 to U.S. East Coast)

## MANUFACTURERS SPECS:

Sony XRF5100 and XR-CA660X

Tuning Range:

AM:

(XRF5100): 530-1710 kHz (9 or 10 kHz steps switchable)

(XR-CA660X): 531-1602 kHz (9 kHz steps)

FM: 87.5-108 MHz

SW1: 2.940-7.735 MHz

SW2: 9.500-18.135 MHz

(except for 10.140-11.575 MHz)

Size: 7-1/8" x 2" x 7"

Antenna connector: Motorola

Price: XRF5100: \$289.00 (U.S.) plus shipping (about \$15)

XR-CA660X \$189.00 (U.S.) plus shipping (about \$15)

*\*LFB Short Wave Converter is made in Brazil. Cost is \$140 + \$15 Shipping. Contact: Luis Loeffelangel@tsp.com.br Website: [www.angelfire.com/ia/lfb](http://www.angelfire.com/ia/lfb) (Review: MT Nov. 2001 page 84)*

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## WiNRADiO DRM Decoder Plug-in For the G303 and G313 receiver series

By Lee Reynolds KD1SQ

### ❖ What is DRM?

Digital Radio Mondiale (DRM) is a method of transmitting audio and multimedia programming on shortwave using a digital data stream instead of the traditional analog AM method. This data stream can be demodulated by a suitably equipped receiver and/or computer into analog audio (and multimedia items, such as web pages) that is free of background noise, interference, and fading, and is of considerably better audio fidelity than the average shortwave AM signal.

Excellent audio and tasty multimedia tidbits are the up side of DRM. The down side of DRM is that, like other digital transmission modes, it requires very good signal to noise ratios for continuous decoding of the data stream into analog audio. Clean signal = great audio. Noisy signal = *no* audio.

With digital it's all or nothing – either the stream can be decoded or it's corrupt and cannot be decoded; no listening down in the noise with this mode! Unfortunately, in the real world, this usually translates to very strong signals being needed to produce the necessary signal to noise ratio.

A number of broadcasters are transmitting DRM signals on shortwave and the AM band, but at this time the huge majority of activity is in Europe. Two notable web resources for information on this mode are [www.drm.org](http://www.drm.org) and [www.drmrx.com](http://www.drmrx.com). Activity is slowly increasing but has a long way to go before it constitutes even 25% of the available short-wave programming hours.

Hardware and software for receiving DRM exists, although there is a very distinct shortage of new standalone DRM capable portable or desktop radios. DRM listeners are usually to be found employing modified short-wave receivers feeding a 12 kHz IF signal into a PC soundcard running decoding software. (Although, again, there are some interesting things being done at this time in Europe in terms of decoder software and hardware.) At this point in time a computer, whether laptop or desktop, is pretty much a fixture in the DRM listener's toolkit.

### ❖ What are the G303 and G313 WiNRADiOs?

These are computer attached (via either an internal PCI slot or an external USB port) Software Defined Radios (SDRs) for short-wave that have reasonably conventional RF

front ends but use DSP (either built-in or in the form of a SoundBlaster-class sound card) to perform the receiver IF and demodulation functions on a 12kHz IF output produced by the front end hardware. These devices also use the computer for a virtual front panel for the radio. (See last month's *MT* for an article on the G131e or visit [www.winradio.com](http://www.winradio.com) and [www.monitoringtimes.com](http://www.monitoringtimes.com) for reviews and more details on these devices.)

Such an approach to reception lends itself readily to a modular approach in terms of receiver abilities; you can 'plug-in' a piece of software that adds new abilities to the receiver. One such 'plug-in' is the WiNRADiO DRM Demodulator/Decoder for the G303/G313 and Windows 98/2000/XP. Addition of this plug-in results in a DRM-capable receiver sporting a seamless user interface.

### ❖ What's needed?

To start using the WiNRADiO DRM decoder you need, of course, a properly installed and configured G303/G313 series receiver. The additional software necessary is the appropriate downloaded demodulator itself (*free*) and the license key that enables it to run (\$US 49.95) – both can be readily obtained at the WiNRADiO web site.

### ❖ Installation

This is simple – unzip the downloaded decoder, execute it, and install it to the directory where you have already installed the G303/G313 software. Copy the license key to the same directory and you're ready to go.

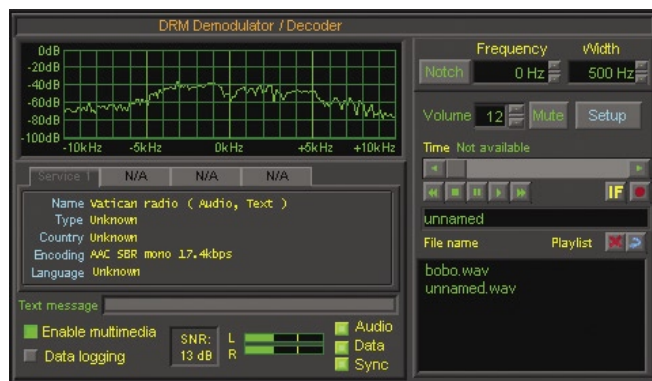
### ❖ Startup

To use the DRM decoder, you open the 'Demodulators' tab on the receiver GUI (graphical user interface) and select 'G313 DRM Demodulator/Decoder'.

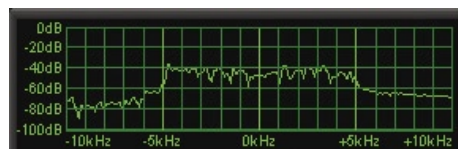
You'll then see the familiar Mode/Bandwidth/Spectrum display component of the interface change to the DRM decoder display. (For first time startup you'll have to configure the audio input for the decoder if you have a G303. If you have a G313 there's no need for it.)



This is where all the fun stuff is. At the top of the interface display is a spectrum display; when you're tuned to a strong DRM signal you'll notice a distinctive plateau-like signal spectrum about 10 kHz wide. This is also where you'll visually guide the notch filter, if needed, to knock out any interfering signal.



Next area down is the 'DRM Services' display. Here you'll see information on the transmission as to audio bandwidth being transmitted, encoding method in use, broadcaster name, country of origin, and show type. There's also a spiffy little ticker display to provide more information on what you're receiving. If the broadcaster is sending more than one channel of programming, you can use the tabs in this display to switch between the shows.



At the bottom of the interface are indicators for L/R channel audio out, on/off switches/indicators for multimedia/data log-



ging and three DRM status indicators – ‘Sync’ which shows that the demodulator has at least a basic lock on the signal, ‘Data’ indicating that it’s getting enough data demodulated to start displaying alphanumeric information about the transmission that’s being sent by the broadcaster (*analogous to the RDS stream that some FM stations transmit*), and ‘Audio’ that lights when audio is being successfully recovered from the data stream.

The ‘SNR’ box shows you the signal to noise ratio in decibels (*dB*) that the demodulator is seeing. This is a very good indicator of whether or not you should be hearing audio from a station. 16dB upwards is about the minimum for continuously decoding audio from a station transmitting a 22 kHz audio stream, 10-11dB is acceptable for a station transmitting a less-high fidelity 11 kHz audio stream. Any less than that and you’ll be getting audio with dropouts or maybe only the alphanumeric information display data being sent by the broadcaster.

(Take a look at the illustration – you’ll observe that there’s a 14dB SNR shown there and data’s coming in with audio being



decoded. The audio indicator’s on and the audio out indicators are active.)

To the right of the interface are controls for a variable bandwidth notch filter for removing any interfering signal from the DRM data stream, audio muting, volume, decoder setup and the recording/playback controls for either audio-level or IF-level signals being received.

## ❖ How to use it?

Just make sure you’ve selected the DRM demodulator plug-in, tune to a frequency on which a DRM signal is being transmitted, and see what happens next. It’s that simple. No extra wiring necessary, no receiver modifications. If it’s a good signal, you’ll see a well-defined plateau on the spectrum display, the three status indicators will rapidly light in sequence, and you’ll be listening to near FM quality audio on shortwave!

## ❖ My take on it.

It’s a no muss, no fuss add-on for your WinRADiO that gives you easy access to DRM transmissions. The interface design and its integration with the receiver GUI is nicely done, providing more than enough tweak points and controls to satisfy the curious user while not scaring off the person who just wants to listen to DRM without getting bogged down in technical details. Audio quality’s good and reception performance is as good as it can be, given the limitations of the DRM transmission method and shortwave medium.

*The WinRADiO G303 and G313 series radios are available in the US from Grove Enterprises ([www.grove-ent.com](http://www.grove-ent.com)), but the free DRM software and \$49 DRM license key can only be obtained directly from WinRADiO ([www.winradio.com](http://www.winradio.com))*

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# In the Air and On the Air

## Free ACARS Decoder and More

**T**his month we are going to look at a free ACARS decoder program called ACARSD; but this program does so much more than just decode. First, let's have a quick review of ACARS.

ACARS, Aircraft Communication Addressing and Reporting System, is a digital transmission broadcast by commercial aircraft in the air and ground stations. These transmissions are around 131 MHz. As the name implies, current aircraft position, as well as other information, is transmitted.

### ❖ Not Just Another ACARS!

The ACARSD program version 1.65, which has lots of unique features, decodes all the information and displays it in ways usually found only in expensive ACARS programs... all for free. (Is "D" for Deutschland? Perhaps the "D" in the name represents where the program was created, or the language that was used. Deutschland = Germany)

ACARSD uses the Internet in ways that I have not seen before. For example, it automatically accesses free web sites for pictures and information of the aircraft being monitored. This program is so feature rich we will just touch on the ones that I personally enjoyed.

My favorite feature is that with ACARSD you can use up to eight scanners simultaneously! This requires a PC with four sound cards. However, if you are like most of us and only have one soundcard, you can still have the program decode from two scanners. This is indispensable if your monitoring location is in a high aircraft traffic area. (More on using multiple scanners later.)

### ❖ READY (For Installation)

ACARSD version 1.65 claims to run on all Windows, 95 and newer. A PC with a soundcard and Internet capability is all that is needed. I ran the program on a number of PCs: a Pentium I 233 under Win98, a Pentium II 333 laptop under Win98 and a Pentium 3 800 MHz running Win XP.

Getting it to a point that you can run it on your PC is a three-step process. The program can be easily downloaded from [www.acasd.org](http://www.acasd.org). However, since it is a 3.5 Meg file be prepared for a wait if you are using dial-up.

Once on your PC the file must be unzipped to a folder. We're not ready to run just yet. From the unzipped folder run the *quickinstall.exe* program. It will ask you

where to install the program. I chose a new folder "ACARSD 1.65." The program then creates the new folder and installs a whole bunch of files (58 files and 4 folders) within the folder.

### ❖ SET (Up)

When I first ran ACARSD it just sat there and did nothing. It was not the program's fault. Instead, it was mine. The fact that there is no full detailed manual, except the "Instructions" tab on the website, didn't help. However, there is useful information on the website, which will be very helpful in understanding ACARS decodes.

Before you do anything, take a look in the ACARSD 1.65 folder that you just created and run the *setup.exe* file. The resulting screen gives the user access to many useful features. We have selected the "Configuration/Installation" command at the top left of the setup screen. Then we have chosen the "Sound" sub-menu, which results in Figure 1.

Because I ran the program on three PCs, two of which were delivered by dinosaurs from the factory, this screen was critical. The two old and slow PCs required (no, demanded) that the first three boxes, in Figure 1, were checked.

For those with a slower PC, you should try checking the first box, "Don't Use Streaming Sound," to speed up things. Checking the next two boxes is required if you are using an old soundcard. The computers running Windows 98SE encountered other problems, while the newer P3 was more well-behaved. (More on this subject later also.)

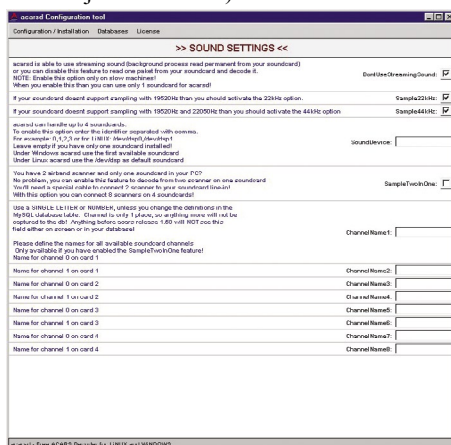


Figure 1 - ACARSD's setup screen on the sound setting menu

Before you exit the Configuration Tool in the setup file, go back to the "Configuration/Installation" command at the top left of the screen and choose "Write new acarsd.ini." This will save the changes we made and re-load them every time we start ACARSD.

### ❖ GO!

Now if you are using Windows 95 or 98, run the *acarsd95.exe* file in the ACARSD folder to start the program. If you are using a version of Windows other than 95 or 98, start *acarsd.exe*. After a few seconds of loading files and connecting to the Internet, Figure 2, ACARSD's Main Window will be displayed.

### ❖ Windows On Air

The Main Window is really six separate windows arranged to be displayed together. The first section, seen at the top of Figure 2, is the command icon window. The large second section positioned at the center-left, dominates the display. Here decoded ACARS messages are displayed in a regular format: ACARS Mode, Message Label, Block ID, Message Number and Flight ID including origin, destination and path. Finally the Message content is displayed. (Google "decoding ACARS messages" for a number of sites which will give you help in decoding the message content.)

In the center-right window, pictures of the monitored aircraft are automatically downloaded from [www.acarsd.org](http://www.acarsd.org).

### ❖ News and Pictures

The first message visible in Figure 2 is from a Continental Airlines Boeing 777. You can see the aircraft in the box to the right of the decoded message. It all happens automatically! Similarly, the Virgin Airways Boeing 774-41R, the originator of the second message can be seen in the next picture. Left clicking on the picture expands it to full screen size. Not all aircraft have pictures associated with them, but the library of photos is growing.

The Internet connection downloads aviation news items and displays them in a scrolling "Times Square" sign format. This is the thin black band section seen below the decoded message area. Information such as the profits of a airline company or new aircraft being purchased are displayed in this area. The data is constantly downloaded and displayed in almost real-time for those of you with high-speed connections.



## ❖ What's It Doing?

The large window below the News section, in Figure 2, informs the user as to what functions ACARSD is busy performing. Here we can see that, once it decoded the a message from Virgin Atlantic Flight VS0045, the program went to its website to search for data on this flight, "Fetching informations for 'VS0045' from www.acarsd.org." Information concerning flights that you have monitored is automatically saved in your database files.

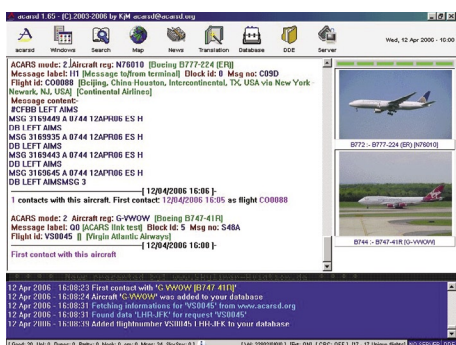


Figure 2 – The Program's main window doing its stuff

And finally, in a tiny font that will challenge even the best eyesight, the bottom of the Main Window is a plethora of program performance information. To name a few: number of good decodes, number of messages and duplications, and number of unique flights monitored which were not originally in your database.

The decoded data can be displayed in an "Alternative" window with the aircraft data presented in a table format by pressing alt-a. Most commands have keystroke combination equivalents.

## ❖ Two for One

Can you use two scanners with one decoder? With ACARSD the answer is, "yes." Look back at Figure 1. In the middle of the screen we have checked the "Sample Two In One." This allows the program to decode the audio from two scanners.

In addition to two receivers, you will need a cable that splits the left and right inputs of the computer stereo soundcard's Line-In jack. This is sometimes called a "Y" cable, with one stereo male and two mono females.

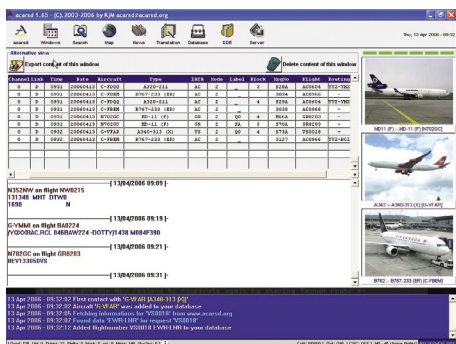


Figure 3 – Using two scanners at once in ACARSD's alternate window

Dollar Tree Stores are a great source for all types of audio cables, for a dollar. That's where I bought mine. Then using two other cables (purchased at the same source), connect the audio output from scanners to the "Y" cable ends.

## ❖ Does It Work?

I tried it on the relatively faster Pentium III with a Pro-2004 and an ICOM R7000 receiver. Surprisingly it worked great! The results are displayed in Figure 3, which is the Alternate table view. It very interesting to hear two receivers tuned to different ACARS frequencies squawking off at nearly the same time. Then seeing two different entries pop-up on the ACARSD's screen. At high traffic times the displays move fast and furiously.

Another method of connecting two receivers is by using an ACARS decoder "box" which connects the receiver's audio to the PC via the serial port and comes with some ACARS programs, for example AIRMASTER. In this case, one receiver uses the soundcard input while the other utilizes the serial interface.

And, of course, another method is to install multiple soundcards in your PC. Then connect one or two receivers to each soundcard. If you need more inputs than that, you must be a government monitoring agency.

## ❖ Much More

In the Configuration/Installation command you will find many, many other user customizable features. These settings include folders, system, sound, report, web server and more. On the Additional Settings menu, the user can disable the feature that automatically sends your database to a public server. The program defaults to auto sending the results of your decodes so that near-real-time aircraft information can be shared by all users. Many other customizable features are found on this menu.

Similarly, Server Mode allows you to automatically share your ACARS decodes with others using ACARSD via the Internet. Select the "Server" icon in at the top right of Figure 2 (main screen) to start it. As with all Internet features a fast connection is really needed, although I made do with dial-up.

## ❖ Advanced ACARS

ACARSD is feature rich. If we expand the "acards" menu in the left side of the top Command line (Figure 2) over twenty user options are accessible. In the "Display flags" sub-menu the user can determine that only "good" messages (meaning fully decoded without receive errors) will be displayed. The extended data display mode, used in all of our figures, or the normal mode can be chosen from this menu. Other items to be displayed in the decode section and maps can be selected in here.

The Command Line menus are used for many other features. The Database menu is used to manipulate aircraft, airline, airport, flight number and mode databases. Map data

including waypoints, airports, stored maps and user created maps are controlled under the Map menu. Under the DDE menu the WACARS or Airmaster mode can be chosen and their serial decoders used.

## ❖ Maybe Mapping

ACARSD has a Mapping feature which sounds great. The location of each ACARS monitored aircraft is plotted on a map. Although there is some sketchy instruction on this topic on their website, I could not get it to operate. I think maps from another site must be downloaded. Here details are very "thin."

Opening the "How To Create Your Own Map" Under the Map command doesn't help. Instructions such as "create a GIF file for your location" and "the ratio of your map must be ok!" just increase the frustration level. I'll keep trying since I believe the results will be worth the effort. Let's keep firmly in mind the cost of ACARSD ... free.

## ❖ My Impressions

On the Windows 98 PCs, ACARSD didn't like sharing with other programs. For example, if Netscape was opened with ACARSD, after a period of time ACARSD stopped working. After shutting down all programs and then re-starting, ACARSD operated normally.

At times on the Win98 PCs it seemed as if ACARSD stopped responding. However, upon further investigation I found that the program was waiting for a large download, such as a picture, to finish. A dial-up connection is just about adequate; however, a high-speed Internet connection would make life easier ... and faster.

One of the test PCs had a video card with a maximum resolution of 800 x 600. Although all windows were readable, the alternative window, displaying the table format required lots of scrolling to make it useful. Viewing of ACARSD is best at 1024 x 768.

In my opinion, ACARSD needs at least a Pentium III 800 MHz CPU PC running Windows XP. On this PC ACARSD ran flawlessly and the program was very tolerant of many other programs running in the background.

Even with its minor irregularities ACARSD would be an excellent commercial program. But for free it hits the top of my ACARS list. Get it at [www.acarsd.org](http://www.acarsd.org). Tell them you saw it in the *Computers & Radio* column of *MT*.

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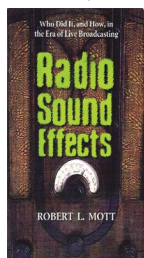
# What's NEW

## Tell them you saw it in Monitoring Times

### Radio Sound Effects

By Robert L. Mott

Robert L. Mott has written a very interesting and valuable book about how things were done behind the scenes in the early days of radio. *Radio Sound Effects, Who Did It, and How, in the Era of Live Broadcasting* is written by a man who participated in the thrilling world of live radio during its heyday of the late 1930s, 1940s and into the 1950s. It was a time when the sound effects teams were an integral part of the production making a script come to life with the sounds of reality. Without these special effects experts, radio scripts would have been dull affairs and perhaps radio's golden age wouldn't have been so golden.



Today's radio listener would find it difficult to imagine the influence radio once held over the American listening public. Unlike movies or newspapers, radio not only informed, it also entertained its audience without requiring them to participate. A major part of that success depended upon the people who created sound effects. A squeaking door, the sounds of a horse or a typewriter all added to the reality of the production.

Robert Mott shares many of the secrets of making sound effects on the radio and tells many of the secret tales of how things really worked on these production sets during this time period. While some of the work may seem dull in comparison, these were true craftsmen and pioneers of the radio age, creating sounds to give radio broadcasts an extra dimension of reality taken for granted today.

Almost no radio program was exempt from the radio sound effects. You would expect drama programs to make good use of sound effects, but even the evening news was "sweetened" to make it sound better! Stories about atom bomb blasts were enhanced with sound effects, or coverage of soldiers advancing used recorded

sounds in the background to make the news come to life.

The author did live sound effects during the Golden Age of radio, working on such live shows as *Gangbusters*, *Phillip Morris Playhouse*, *Mr. Chameleon* and *Perry Mason*. In this book, he provides many insights into the early days of the medium as it grappled with entertaining an audience based only on the sense of hearing. How the sounds were produced is fully covered, as are the artists responsible for the production. The numerous stories of successful sound effects are balanced by an array of equally embarrassing and funny failures.

*Radio Sound Effects* is more than a mere retelling of old stories about the Golden Age of Radio. With its behind-the-scenes approach, *Radio Sound Effects* gives the reader a unique perspective in the production of radio programs in the early days. Radio was the dominant medium, and the biggest stars of the day worked in radio. The telling of long lost tales, with a great assortment of priceless pictures from that era, provides the radio fan with insight into the lost art of radio production.

For better or worse, the sound effects men and women were always involved in these productions. From quiz shows, to comedy to drama, each show featured sound effect legends to make the production work. The book presents insights into how producers sometimes cut corners on sound effects only to have that penny pinching attitude come back to haunt them in lost production values.

Reading many of these behind the scenes accounts will make you wonder how radio producers ever got these radio programs on the air in the first place. There were many close calls unknown to the listening audience that the author recounts with great humor. Live radio was an exciting time, and this book takes on extra significance when we realize that the stories Mott has written about just couldn't happen today because technical equipment has taken over the sound effects business.

*Radio Sound Effects* (ISBN 0-7864-2266-1) is 303 pages, soft-

bound (5.5 x 8.5-inch), including 110 photographs and illustrations, diagrams and index. This edition is a reprint of the bound library edition that was first published by McFarland and Company in 1993. It is available direct from the publisher McFarland & Co., Inc. (Box 611, Jefferson, NC 28640) for US\$29.95 plus US\$4.00 shipping and handling in the United States or US\$6.00 elsewhere. Also, orders may be placed by telephone (1-800-253-2187) or FAX (1-336-246-5018) or through the publishers' website [www.mcfarlandpub.com](http://www.mcfarlandpub.com). Orders can be charged to VISA, MasterCard, AMEX, or Discover cards.

— Reviewed by Richard A. D'Angelo

### Ham Radio Podcast

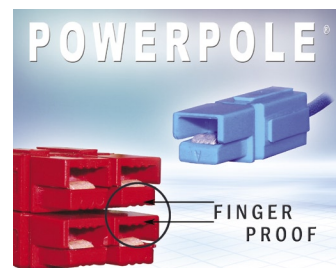
Turning now from the history of radio to brand new technologies, *MT* readers will be interested in a new ham radio show transmitted by podcast. *HamRadioCast* is brought to you by Studio1AProductions. com to be a resource and reference for Amateur Radio hardware and software products. Reading about a transceiver is good, but the audio format allows you to actually hear it. The format is casual and fun.

As you can see by the previous podcasts posted on their evolving website at [www.hamradiocast.com](http://www.hamradiocast.com), topics for discussion are not limited to ham radio equipment. In fact – drum roll please – Episode #18 is a lengthy interview with *MT* publisher Bob Grove on topics ranging from antennas to shortwave receivers to scanners! Go to the website and click on your preferred format – podcast, RSS, or iTunes!

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